Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Section 68.4(a) of the Commission's Rules	)	
Governing Hearing Aid-Compatible Telephones	)	WT Docket No. 01-309
	)	RM-8658
	)	
	)	

REPORT AND ORDER

Adopted: July 10, 2003 **Released: August 14, 2003**

By the Commission: Chairman Powell, Commissioner Abernathy, Commissioner Copps, Commissioner Martin, and Commissioner Adelstein issuing separate statements.

I INTRODUCTION 2

II EXECUTIVE SUMMARY 2

III BACKGROUND 4

A Hearing Aids and Wireless Phones 4

B The HAC Act and Existing Commission Rules 5

C Efforts to Facilitate Wireless Accessibility 7

D Technical Description of Hearing Aids and Digital Wireless Phones 11

IV ANALYSIS OF STATUTORY CRITERIA 12

A Adverse Effect on Hearing Impaired Individuals 14

B Public Interest 16

C Technological Feasibility 17

D Marketability 23

V REQUIREMENTS FOR HEARING AID COMPATIBILITY OF WIRELESS PHONES 23

A Adoption of ANSI C63.19 Performance Levels as the Applicable Technical Standard 24

B Implementation Requirements 28

C Labeling, Reporting, and Outreach 33

D Enforcement 37

VI PROCEDURAL MATTERS 37

A Regulatory Flexibility Act 37

B Paperwork Reduction Act 37

C Accessible Formats 38

VII ORDERING CLAUSES 38

APPENDIX A – List of Commenters and Reply Commenters

APPENDIX B – Final Regulatory Flexibility Analysis

APPENDIX C – Final Rules

I. INTRODUCTION

1 In this Report and Order, we modify the exemption for wireless phones under the Hearing Aid Compatibility Act of 1988 (HAC Act)[1] to require that digital wireless phones be capable of being effectively used with hearing aids We find that modifying the exemption in the manner described below will extend the benefits of wireless telecommunications to individuals with hearing disabilities – including emergency, business, and social communications – thereby increasing the value of the wireless network for all Americans

2 In order to make digital wireless phones accessible to individuals who use hearing aids or have cochlear implants, we find that digital wireless phone manufacturers and service providers should be required to take steps to reduce the amount of interference emitted from digital wireless phones and to provide the internal capability for telecoil coupling. In taking this action, we hope to enable every American to have access to digital wireless telecommunications. Because we find that the statutory requirements for modifying the exemption have been met, and because doing so will serve the important public interest in preserving access to wireless telecommunications for individuals with hearing disabilities, we conclude that the exemption should be modified to the extent described below.

II. EXECUTIVE SUMMARY

3 In this Order, we take the following actions

(1) adopt certain performance levels set forth in a technical standard established by the American National Standards Institute (ANSI) as the applicable technical standard for compatibility of digital wireless phones with hearing aids,

(2) require certain digital wireless phone models to provide reduced radio frequency (RF) interference (*i.e.*, meet a "U3" rating under the ANSI standard), and require certain digital wireless phone models to provide telecoil coupling capability (*i.e.* meet a "U3T" rating under the ANSI standard),

(3) require, within two years, each digital wireless phone manufacturer to make available to carriers and require each carrier providing digital wireless services to make available to

[1] Section 710 of the Communications Act of 1934, as amended, 47 U S C § 710(b)(1)(B)

consumers at least two handset models for each air interface it offers which provide reduced RF emissions ("U3" rating),

(4) require each Tier I wireless carrier providing digital wireless services to make available to consumers within two years at least two handset models for each air interface it offers which provide reduced RF emissions ("U3" rating) or 25 percent of the total number of phone models it offers, whichever is greater;

(5) require, within three years, each digital wireless phone manufacturer to make available to carriers and require each carrier providing digital wireless services to make available to consumers at least two handset models for each air interface it offers which provide telecoil coupling ("U3T" rating),

(6) adopt a *de minimis* exception for certain digital wireless phone manufacturers and carriers;

(7) encourage digital wireless phone manufacturers and service providers to offer at least one compliant handset that is a lower-priced model and one that has higher-end features,

(8) require 50 percent of all digital wireless phone models offered by a manufacturer or carrier to be compliant with the reduced RF emissions requirements by February 18, 2008,

(9) require wireless carriers and digital wireless handset manufacturers to report semiannually (every six months) on efforts toward compliance during the first three years, then annually thereafter through the fifth year of implementation,

(10) require manufacturers to label packages containing compliant handsets and to make information available in the package or product manual, and require service providers to make available to consumers the performance ratings of compliant phones,

(11) commit the Commission staff to deliver a report to the Commission shortly after three years from the effective date of this Order to examine the impact of these requirements, and which will form the basis for the Commission to initiate a proceeding soon after the report is issued to evaluate whether to increase or decrease the 2008 requirement to make 50 percent of phone models with reduced RF emissions, whether to adopt implementation benchmarks beyond 2008, and whether to otherwise modify the implementation requirements,

(12) encourage hearing aid manufacturers to label their pre-customization products according to the ANSI standard, and

(13) deny the petition of Myers Johnson, Inc , for revision of section 24.232 as it relates to directional wireless phone antennas

4 We take these actions to facilitate the Congressional goal of ensuring access to telecommunications services for individuals with hearing disabilities In light of the rising number of calls to emergency services placed by wireless phone users, preserving access to wireless telecommunications for individuals with hearing disabilities is critical. In addition to the public safety benefits, these actions will also extend to individuals with hearing disabilities the social, professional, and convenience benefits offered by wireless telecommunications as well In light of our society's increased reliance on wireless phones and the growing trend among wireless carriers to move away from analog services in favor of more efficient, feature-rich digital services, these steps will ensure that individuals with hearing disabilities continue to enjoy access to wireless telecommunications devices and services

III. BACKGROUND

A. Hearing Aids and Wireless Phones

5 Approximately one in ten Americans – 28 million – has some level of hearing loss, and this proportion increases to one in three among the population of people over 65 years of age [2] As the median age of the population continues to rise, the proportion of Americans with hearing loss will likely increase Approximately six million Americans use hearing aids to improve their hearing [3] Hearing aids operate in one of two modes – acoustic coupling or telecoil coupling Hearing aids operating in acoustic coupling mode receive and amplify all sounds surrounding the user, both desired sounds, such as a telephone's audio signal, as well as unwanted ambient noise Hearing aids operating in telecoil coupling mode avoid unwanted ambient noise by turning off the microphone and receiving only magnetic fields generated by telecoil-compatible telephones [4] In the United States, about 25-30 percent of hearing aids contain telecoils, which generally are used by individuals with profound hearing loss [5] External accessories designed to generate a magnetic field to enable telecoil coupling help some hearing aid users, but can be cumbersome and are not usable by all hearing aid users [6]

6 Although analog wireless phones do not generally cause interference problems for hearing aid users,[7] digital wireless phones can cause interference to hearing aids and cochlear implants because of electromagnetic energy emitted by the phone's antenna, backlight, or other components. This interference can be significant enough to prevent individuals with hearing aids or cochlear implants from using digital wireless phones and services In addition, most wireless phones do not internally provide the capability to inductively couple with hearing aids containing telecoils, as wireline phones do.[8]

7 Over the course of the last several years, wireless phones and services have increasingly become mass market consumer devices and services As the Commission reported in its *Eighth Annual CMRS Competition Report (Eighth Competition Report)*, penetration rates for wireless subscribers (as of December 2002) were approximately 49 percent of the United States population, and more than 55 percent of Americans between the ages of 15 and 59 have wireless phones.[9] In addition, while still

---

[2] *See* SHHH Comments at 2, SHHH *Ex Parte* Fact Sheet (May 19, 2003)

[3] *See* American Speech-Language-Hearing Association "Incidence and Prevalence of Hearing Loss and Hearing Aid Use in the United States - 2002 Edition" (visited June 24, 2003) <http //professional asha org/resources/factsheets/hearing cfm>.

[4] *See* Self Help for Hard of Hearing People, "Hearing Loss, Sept -Oct., 1996" (visited April 17, 2003) <http //www shhh org/Advocacy/Position/tcoil cfm> *See* also HearingLoop org "Frequent Questions" (visited June 26, 2003) <http //www hearingloop org/fq_preferred htm> Audio signal-based magnetic fields, such as those produced by the voice coil of the speaker in hearing aid-compatible wireline telephones, are picked up by the hearing aid telecoil, amplified as needed, and converted back into sound by the hearing aid speaker.

[5] *See* SHHH May 19, 2003, *Ex Parte* Fact Sheet, HIA Jan 7, 2003, *Ex Parte* Presentation Some commenters have claimed that at least some hearing aid users who have telecoils do not use them *See* Cingular Dec 18, 2002, *Ex Parte* at 5, AAES Comments at 6

[6] *See* Vickery Comments at 3, AG Bell Comments at 4, 6

[7] *See* ANSI ASC C63 SC8 Comments at 10

[8] *See* Vickery Comments at 19, 22 *See also* L Kozma-Spytek, M A , Research Audiologist, Gallaudet University Technology Access Program, Washington, D C , "Digital Wireless Telephones and Hearing Aids" (visited June 17, 2003) <www audiologyonline com> and B J Wilson, "Why Don't Cell Phones Work With Hearing Aids?" (visited Feb 2, 2003) <http //www geocities com/Heartland/Prairie/4727/bbhcellemi htm>

[9] *See* Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services Report, *Eighth Report*, at sections II C 1 b (1) and II C 1 d (2003) (*Eighth Competition Report*)

relatively small in number, more and more consumers are beginning to view their wireless phone as their primary phone As reported in the Commission's *Seventh Competition Report*, three to five percent of wireless customers use their wireless phone as their only phone, and according to a USA Today/CNN/Gallup poll, almost one in five wireless telephony users view their wireless phone as their primary phone [10] And the number of customers subscribing to digital wireless service now makes up approximately 88 percent of all wireless subscribers, with 125 million subscribing to digital services and only 17 million subscribing to analog service [11] In contrast to analog, digital technology provides better sound quality and increases spectral efficiency which, in turn, has permitted companies to offer calling plans with large buckets of relatively inexpensive minutes, free enhanced services such as voicemail and caller ID, and wireless data and mobile Internet offerings [12] In addition, 30 to 50 percent of calls to 911 for emergency services now come from wireless phones.[13] Thus, as wireless service has evolved to become increasingly more important to Americans' safety and quality of life, the need for individuals with hearing disabilities to have access to wireless services has become critical. As Congress and the Commission have recognized, individuals with disabilities need access to telecommunications service to ensure they can more fully participate in a society that increasingly relies on these services

B. The HAC Act and Existing Commission Rules

8 HAC Act. Understanding that telecommunications services are an essential component of our daily lives, Congress enacted the HAC Act in 1988 to provide access to telecommunications services for individuals with hearing disabilities In adopting the HAC Act, the House of Representatives Report stated that "the inability to use all telephones imposes social and economic costs on not only the hearing impaired, but the whole nation "[14] It further stated that "the hearing impaired should have access to every telephone like the non-hearing impaired "[15] Therefore, the HAC Act was intended to enable individuals with hearing disabilities to use virtually every telephone.[16] Through the HAC Act, Congress charged the Commission with "establishing regulations as are necessary to ensure reasonable access to telephone service by persons with impaired hearing."[17] Specifically, the HAC Act required the Commission to establish regulations to ensure that the enumerated "essential phones" would provide "internal means" for effective use of hearing aids designed to be compatible with telephones that meet established technical standards for hearing aid compatibility [18] In addition, the statute required nearly all telephones

---

[10] *See* Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services Report, *Seventh Report*, 17 FCC Rcd 12985, 13017 (2003) (*citing* a poll that indicates one in five wireless telephony users considers their wireless phone to be their primary phone) (*Seventh Competition Report*)

[11] *Eighth Competition Report* at section II C 1 b (i)

[12] *Seventh Competition Report*, 17 FCC Rcd 12985, 13009

[13] The National Emergency Number Association (NENA) estimates that, of the 150 million calls that were made to 911 in 2000, 45 million of them (30 percent) were made by wireless telephone users NENA anticipates that, by 2005, the majority of 911 calls will be from wireless callers *See* "Wireless 9-1-1 Overview" (visited June 26, 2003) <http //www nena9-1-1 org/Wireless911/Overview htm> (NENA Wireless 9-1-1 Overview)

[14] *See* H.R Rep No 100-674, at 7 (1988) (*House Report*)

[15] *Id*

[16] *Id* at 3

[18] *See* 47 U S C § 610(b)(1)(B). Congress defined the "essential phones" required to comply as "only coin-operated phones, telephones provided for emergency use, and other telephones frequently needed for use by persons using [compatible] hearing aids " *See* 47 U S C § 610(b)(4)(A) The Act also forbade the Commission from requiring retrofitting of equipment to achieve the purposes of the Act, except for coin-operated telephones and telephones provided for emergency use *See* 47 U.S C § 610(f)

manufactured in the United States (other than for export) or imported for use in the United States after August 16, 1988, to be hearing aid compatible as defined in the statute [19]

9 Congress specifically exempted certain telephones, including telephones used with public mobile service (wireless phones), from the "essential phones" designation. Congress considered the exempted phones to be "secondary," meaning that such phones were viewed at the time to be complements, as opposed to substitutes, for the "essential phones" it identified [20] At the time of the HAC Act's adoption, wireless phones were primarily business tools. However, members of Congress realized that wireless phones may play an increasingly vital role in our society. To make certain that the HAC Act kept pace with the evolution of telecommunications, it granted the Commission a means by which to revoke or limit the exemption for wireless phones Thus, the statute directs the Commission to periodically assess the appropriateness of continuing the exemptions.[21] Specifically, the statute requires us to "revoke or otherwise limit" the exemptions if we determine that

i such revocation or limitation is in the public interest,

ii continuation of the exemption without such revocation or limitation would have an adverse effect on hearing-impaired individuals,

iii compliance with the requirements of [the rule] is technologically feasible for the telephones to which the exemption applies; and

iv compliance with the requirements of [the rule] would not increase costs to such an extent that the telephones to which the exemption applies could not be successfully marketed.[22]

10 FCC Rules The Commission initially adopted rules implementing the HAC Act in 1989.[23] In 1992, the Commission expanded the HAC requirements to apply to telephones in particular establishments, such as hospitals, hotels and motels, prisons, and workplaces.[24] In 1996, the Commission adopted regulations designed to ensure that individuals with hearing disabilities would be able to use "virtually all wireline phones in workplaces, confined settings, and hotels and motels."[25] The Commission adopted rules relating to volume control to ensure that telephones were more accessible for

[19] *See* 47 U S C § 610(b)(1)

[20] *See House Report* at 9 *See also* 47 U S C § 610(b)(2)(A) Public mobile services are air-to-ground radiotelephone services, cellular radio telecommunications services, offshore radio services, rural radio services, public land mobile telephone services, and other common carrier radio communications services covered by Part 22 of our rules *See* 47 U S C § 610(f), 47 C.F.R § 68.3 The term public mobile services was subsequently reclassified as commercial mobile radio service (CMRS) *See* Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, Second Report and Order, 9 FCC Rcd 1411 (1994) (implementing Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993)

[21] 47 U S C § 610(b)(2)(C)

[22] 47 U S C § 610(b)(2)(C), 47 C.F.R § 68 4(a)(4) Although the Commission announced that it would review the exemptions every five years, it has not done so since their initial promulgation in 1989 Access to Telecommunications Equipment and Services by the Hearing Impaired and Other Disabled Persons, 4 FCC Rcd 4596, 4600 (1989)

[23] *See* Access to Telecommunications Equipment and Services by the Hearing Impaired and Other Disabled Persons, CC Docket No 87-124, *First Report and Order*, 4 FCC Rcd 4596 (1989)

[24] *See* Access to Telecommunications Equipment and Services by Persons With Disabilities, CC Docket No. 87-124, *Notice of Proposed Rulemaking*, 11 FCC Rcd 4338 (1995). The rules required that, with minor exceptions, all wireline telephones in hospitals and other health care facilities, in hotels and motels, in prisons, and in all workplaces be made telecoil compatible by May 1, 1993 The Commission subsequently stayed its rules and impaneled a Rulemaking Committee, which proposed rules that the Commission sought comment on in 1995

those that use hearing aids and others with hearing impairments.[26] In addition, the Commission required telecoil compatibility of all telephones that are required to be hearing aid compatible.[27] Specifically, the Commission required that, except for telephones used with public mobile services, telephones used with private radio services, and secure telephones, every telephone manufactured in the United States (other than for export) or imported for use in the United States must be hearing aid compatible as defined in section 68 316 of the Commission's rules [28] Finally, the Commission required all telephones with telecoil compatibility to be labeled with the letters "HAC," to more readily identify hearing aid-compatible phones to consumers [29]

11 In addition to its rules on technical standards and requirements for compliance, the Commission clarified the status of the HAC Act in light of the adoption by Congress in the intervening years of the Americans with Disabilities Act of 1990[30] and section 255 of the Telecommunications Act of 1996 [31] In the *Wireline HAC Order*, the Commission determined that the protections afforded individuals with hearing disabilities under the HAC Act provided greater protection than those afforded under the "reasonable accommodation" standard provided by the ADA, and thus as stated in the ADA, the HAC Act was not intended to be invalidated. [32] With regard to section 255 of the 1996 Act, the Commission found that while this section shares a similar goal with the HAC Act, namely access to the telecommunications network by individuals with disabilities, the HAC Act remains binding law by operation of section 601 of the 1996 Act Section 601 states that the 1996 Act "and amendments made by this Act shall not be construed to modify, impair, or supersede Federal, State, or local laws unless expressly so provided in such Act or amendments."[33] The Commission concluded that the HAC Act remained unaltered [34]

C. Efforts to Facilitate Wireless Accessibility

12. In 1995, the HEAR-IT NOW Coalition (HEAR-IT NOW) filed a petition in which it argued that a limited revocation of the exemption for digital wireless phones was warranted under the four criteria.[35] HEAR-IT NOW appended to its petition studies demonstrating interference experienced by hearing aid users when attempting to use, or even simply standing near, a Global System for Mobile Communications, or GSM, wireless telephone [36] HEAR-IT NOW argued that such interference prevents individuals who are hard of hearing from using Personal Communications Service (PCS) devices, thus excluding them from the next phase of the telecommunications revolution.[37]

---

[26] *See Wireline HAC Order*, 11 FCC Rcd 8249, 8279. *See also* 47 C.F R §§ 68 6, 68.317

[27] *See Wireline HAC Order*, 11 FCC Rcd 8249, 8251

[28] *See* 47 C F R § 68.4 *See also* 47 C F R § 68 316

[29] *See Wireline HAC Order*, 11 FCC Rcd 8249, 8291 *See also* 47 C F R § 68 300

[30] Americans with Disabilities Act of 1990, Pub L 101-336, 104 Stat 328 (1990), *codified at* 42 U S.C §§ 12101-12213 (ADA)

[31] Telecommunications Act of 1996, Pub L 104-104, 110 Stat 56 (1996) (1996 Act)

[32] *See Wireline HAC Order*, 11 FCC Rcd 8249, 8258-59 *See also* 42 U S C § 12201(b)

[33] *Codified at* 47 U S C § 152 nt Section 601(c) of the 1996 Act, Pub L. 104-104, Title VII, § 601, Feb. 8, 1996, 110 Stat 143, is reproduced in the notes under 47 U S C § 152

[34] *See Wireline HAC Order*, 11 FCC Rcd 8249, 8259-60

[35] *See* HEAR-IT NOW Petition at 5-8

[36] HEAR-IT NOW Petition at Appendices 1-4

[37] *See* HEAR-IT NOW Petition at 5-6

13 In response to the HEAR-IT NOW petition, the Commission established a steering committee and working groups to develop and report to the Commission on possible solutions to problems faced by individuals with hearing disabilities in using digital wireless telephones That committee, at the direction of the Commission, organized the Hearing Aid Compatibility and Accessibility to Digital Wireless Telecommunications Summit, which convened in January 1996 [38] Summit participants, who included representatives of digital wireless phone manufacturers and other interested parties, later submitted a report to the Commission on the agreements of the parties [39]

14 As detailed in the report, the participants agreed that interface and accessibility problems could only be solved through a combination of both modifications to digital wireless phone designs and improvements in hearing aid immunity to RF emissions.[40] Additionally, the participants recognized that educating individuals with hearing disabilities on the compatibility issues could help foster understanding and encourage access to wireless telecommunications.[41] The participants also recognized that to promote consumer choice, they would need to pursue a range of options, given the range of levels of hearing loss and the range of means to address that loss [42] Moreover, the participants agreed that further research would be needed to identify objective levels of interference that hearing aid users could tolerate [43] They also agreed that the results of that further research would then be used to establish a preliminary matrix with recommended performance targets for electromagnetic emission and immunity levels that would serve as an interim benchmark.[44]

15. Concurrent with the work of the steering committee, the University of Oklahoma began research into the interaction between hearing aids and digital wireless phones. The study, which tested hearing aids manufactured for eighteen participants with hearing disabilities, sought to determine the levels of interference from digital wireless phones to hearing aids and to relate subjective ratings of speech intelligibility, usability, and annoyance to those interference levels. Results of the study support the use of acoustic measurements of immunity as a basis for a standard. The results also demonstrate the existence of a number of digital wireless phones that can be used successfully with hearing aids. Six of the eighteen hearing aids experienced no interference or only very slight interference at the highest power level when used with both 800 MHz and 1900 MHz digital wireless phones.[45] These results served as the basis for the development and adoption of a voluntary standard by ANSI in April 2001, namely, the "American National Standard for Methods of Measurement between Wireless Communication Devices and Hearing Aids ANSI C63.19-2001" (ANSI C63.19).

16 ANSI C63.19, which was developed by a Task Group that included representatives of several wireless phone manufacturers, wireless carriers, representatives of the FCC and FDA, and other interested parties, provides guidance on measuring digital wireless phones' RF emission levels and hearing aids' immunity levels to the RF emissions, and specifies rating categories for different levels of RF emissions

[38] *See* Wireless Telecommunications Bureau Fiscal Year 1995-1996 Progress Report, 1996 WL 668142 (Nov. 19, 1996) Invitees to the summit included representatives from the digital wireless phone industry, organizations representing individuals with hearing loss, and hearing aid manufacturers

[39] *See* Letter from Pamela J Ransom, Summit Facilitator, to Chairman Reed Hundt, FCC (May 16, 1996) (Summit Agreement)

[40] *Id*

[41] *Id*

[43] *Id*

[44] *Id*

[45] "Investigation of the Interaction Between Wireless Phones and Hearing Aids, Phase III-B Subjective Validation Study" at 31, University of Oklahoma Center for the Study of Wireless Electromagnetic Compatibility, performed for ANSI C63 19 (October 1999)

and immunity The RF rating categories are intended to assist hearing aid users with the selection of a digital wireless phone that will be usable with a particular hearing aid In addition, ANSI C63 19 provides guidance on measuring digital wireless phones' desired and undesired magnetic field emission levels and hearing aids' immunity to undesired magnetic fields, and specifies rating categories for different levels of magnetic field emissions and immunity The magnetic field rating categories are intended to assist hearing aid users in choosing a digital wireless phone that can be successfully operated with a particular telecoil- or acoustic coupling-capable hearing aid [46]

17 In October 2000, while the ANSI C63 19 standard was still awaiting final approval, the Wireless Access Coalition (WAC) formally requested that the Commission reopen the petition for rulemaking filed in 1995 by HEAR-IT NOW, seeking to revoke the exemption for PCS devices from the Commission's rule requiring telephones to be hearing aid compatible [47] In its petition, WAC noted the qualified success of the steering committee and the working groups to bring about consensus on certain issues and the development of ANSI C63 19 [48] WAC, however, also expressed its disappointment in progress on the "central problem" of digital wireless phones' interference with hearing aids [49] WAC reiterated its belief in the need for the Commission to address this central problem quickly, noting that PCS providers continue to offer more feature-rich services at lower prices, as compared to their analog offerings, over their digital PCS networks [50] If not addressed, WAC is concerned that hearing aid users will find themselves marginalized from mainstream communications, resulting in a regression to more dependent, less productive lives [51]

18 In 2001, responding to both WAC's formal request and the HAC Act's requirement that the Commission periodically review the appropriateness of the exemption, the Commission released a Notice of Proposed Rulemaking (*Notice*) to reexamine the wireless phone exemption provided by the HAC Act [52] In the *Notice*, the Commission sought comment on issues related to requirements of the statute for repeal or limiting of the HAC Act exemption. The Commission sought comment on operation of the requirements of the HAC Act as they relate to establishment of technical standards and the meaning of the phrase "internal means "[53] Additionally, the Commission sought comment on the limitations on compatibility imposed by the statute in requiring that telephones only be compatible with "hearing aids that are designed to be compatible with telephones that meet established technical standards for hearing aid compatibility "[54]

19. The Commission also sought comment on whether the four criteria in the statute, which must be met before the Commission can revoke or limit the wireless phone exemption, have been met Based on the decline in analog service offerings coupled with the rise in more efficient, lower-cost, and feature-rich digital offerings, the Commission tentatively concluded that limiting the exemption would serve the

[46] *See* ANSI C63 19 at 1-2

[47] *See* Petition for Rulemaking of Helping Equalize Access Rights in Telecommunications Now (HEAR-IT NOW), In the Matter of Section 68 4(a) of the Commission's Rules, Hearing Aid-Compatible Phones, RM-8658 (filed June 5, 1995) (HEAR-IT NOW Petition), Request of WAC to Reopen the Petition for Rulemaking, RM-8658 (filed October 10, 2000) (WAC Request)

[48] *See* WAC Request at 2

[49] *Id* at 3

[50] *Id*

[51] *Id* at 4

[53] *Notice*, 16 FCC Rcd 20558, 20564-65

[54] *Id*. 16 FCC Rcd 20558, 20565

public interest [55] The Commission also tentatively concluded that continuation of the exemption without limitation would have an adverse effect on individuals with hearing disabilities. The Commission based its tentative conclusion on the growing prevalence of digital wireless phones and the declining availability of analog phones and service [56] It further noted that access to applications that are possible through use of a digital wireless phone, such as short messaging service, e-mail, and Internet access would allow the benefits of these features to be experienced by individuals with hearing disabilities [57]

20 Regarding the technological feasibility criterion in the HAC Act, the Commission sought comment on ways in which hearing aid manufacturers, digital wireless phone manufacturers, and service providers could work together to develop long-term solutions to compatibility problems [58] The Commission also sought comment on whether a "pairing" approach, recommended by CTIA, would satisfy the requirements of the statute.[59] The Commission further sought comment on whether the costs of compliance with the HAC Act would increase costs to such an extent that the digital wireless phones could not be successfully marketed [60] Finally, the Commission sought comment on the costs and benefits to all telephone users of requiring compliance,[61] as well as whether full revocation of the exemption or a limited exemption was warranted [62]

21 Recognizing the efficiencies that wireless carriers can gain from using digital technology, the Commission's *Analog Sunset Order* established a process by which carriers may discontinue providing analog service [63] In that Order, the Commission found that it was appropriate to eliminate the analog requirement contained in our rules because of the competitive nature of wireless telephony. In addition, the Commission believed that the spectral efficiency that would be gained supported elimination of the analog service requirement [64] The Commission, however, also recognized that analog service has offered individuals with hearing disabilities access to wireless telephony, and therefore immediate removal of the analog requirement could create access barriers to wireless telephony for individuals with hearing disabilities.[65] It therefore decided to adopt a sunset period of five years to allow carriers to resolve problems associated with access to digital wireless service by individuals with hearing disabilities. To monitor the adequacy of access to wireless telephony, the Commission required certain nationwide wireless carriers to report on the availability and usability of hearing aid-compatible digital devices.[66]

---

[55] *Id* , 16 FCC Rcd 20558, 20567

[56] *Id* , 16 FCC Rcd 20558, 20568

[57] *Id* , 16 FCC Rcd 20558, 20568

[59] *Id* , 16 FCC Rcd 20558, 20569 The pairing approach would test and categorize digital wireless phones and hearing aids based on the phone's RF emission levels and magnetic field quality, and the hearing aid's immunity to interference, as specified in the ANSI C63 19 standard The information could then be used to pair a hearing aid and wireless phone based on their respective ratings *See* ANSI C63 19 at 1-5

[60] *Id* , 16 FCC Rcd 20558, 20569

[61] *Id* , 16 FCC Rcd 20558, 20569-70

[62] *Id* ,16 FCC Rcd 20558, 20570-71

[63] See Year 2000 Biennial Review – Amendment of Part 22 of the Commission's Rules to Modify or Eliminate Outdated Rules Affecting the Cellular Radiotelephone Service and Other Commercial Mobile Radio Services, WT Docket No 01-108, Report and Order, 17 FCC Rcd 18401, 18414-20 (2002) (*Analog Sunset Order*)

[64] *Id* , 17 FCC Rcd 18401, 18406

[65] *Id*

[66] *Id*

D. Technical Description of Hearing Aids and Digital Wireless Phones

22 A hearing aid is an electronic device that amplifies weak sounds and transmits them through a small speaker Hearing aids come in several models, behind-the-ear (BTE), in-the-ear (ITE), in-the-canal (ITC), and completely-in-the-canal (CIC) A hearing aid's components include a microphone, amplifier, and speaker Additionally, some models have a coil of wire known as a telecoil or "t-coil " Hearing aids operate in one of two coupling modes, acoustic or inductive (known as "telecoil mode"), with the latter typically being employed by those with profound hearing loss As we have noted, approximately 25-30 percent of hearing aids sold in the United States include telecoils [67] In acoustic coupling mode, the microphone picks up surrounding sounds, desired and undesired, and converts them into electrical signals The electrical signals are amplified as needed and then converted back into sound by the hearing aid speaker In telecoil mode, with the microphone turned off, the telecoil picks up the audio signal-based magnetic field generated by the voice coil of a dynamic speaker in hearing aid-compatible telephones, audio loop systems, or powered neck loops. The hearing aid converts the magnetic field into electrical signals, amplifies them as needed, and converts them back into sound via the speaker. Using a telecoil avoids the feedback that often results from putting a hearing aid up against a telephone earpiece, can help prevent exposure to over amplification, and eliminates background noise, providing improved access to the telephone [68]

23 Cochlear implants bypass the external and middle ears by using electrical stimulation of electrodes implanted in the cochlea to reintroduce the signals carried by auditory nerve fibers to the brain With a cochlear implant, a microphone in a headpiece worn at the ear is connected via a thin cable to a processor that is worn on the belt, carried in a pocket or, in some models, worn at ear level The processor translates the signal from the microphone into digital signals that are sent to a transmitter (in some models, the transmitter and microphone are in the same piece). The transmitter, which is held by a magnet on the side of the head behind the ear, sends the coded signals via radio waves through the skin to the cochlear implant. The signals are directed to auditory nerve fibers using an array of electrodes implanted in the deaf patient's cochlea where they elicit patterns of nerve activity that the brain interprets as sound [69] Some cochlear implants are now being manufactured with built-in telecoils, which could enable a user to hear more clearly when using a hearing aid-compatible telephone, neck loop, or in the vicinity of an audio loop.[70]

24. Individuals with hearing disabilities that use hearing aids or cochlear implants, whether only capable of acoustic coupling or also capable of telecoil coupling, may encounter several problems when using digital wireless telephones The pulsing nature of RF signals from digital wireless phones can interfere with a hearing aid operated in acoustic or telecoil coupling mode, preventing acceptable use by

---

[67] *See* "Hearing aids" (visited June 26, 2003) <http //www.hearingaidhelp com/hearingaids.html>. *See also* "Telecoils in Hearing Aids in the USA" (visited June 26, 2003) <http //hohadvocates.org/telecoils htm> Some commenters indicate that there may be some hearing aid users who do not utilize the telecoil functionality, even though it is included in their hearing aids *See* AAES Comments at 3-6, CTIA Comments at 9

[68] *See supra* note 4 *See also* D Mulvany, MSW, LCSW, "Choices in Hearing Aids" (visited March 14, 2002) <http //members tripod com/~Dana_Mulvany/HearingAids htm>

[69] *See* Dr D K Eddington and M.L Pierschalla, "Cochlear Implants Restoring Hearing to the Deaf," *The Harvard Mahoney Neuroscience Institute Letter On The Brain*, Fall 1994 Volume 3, Number 4 (visited Feb 28, 2003) <http //www med harvard edu/publications/On_The_Brain/Volume3/Number4/Cochlear.html> *See also* "How a Cochlear Implant Works" (visited June 26, 2003) <http //www earsugery org/howto html> and P.C. Loizou, "Introduction to cochlear implants" (visited Feb 28, 2003) <http //www utdallas edu/~loizou/cimplants/tutorial/tutorial.htm>

[70] *See* Center On Disabilities Technology And Persons With Disabilities , "Conference 2003 Conference Proceedings" (visited June 26, 2003) <http //www csun edu/cod/conf/2003/proceedings/133.htm>

the hearing aid user This form of electromagnetic interference (EMI), which is produced as a result of pickup and demodulation of the RF field by the hearing aid circuitry, will generate noise in hearing aids if detected during telecoil operation, and may even introduce interference to hearing aids operated in acoustic coupling mode In addition, whether the hearing aid is being operated in acoustic or telecoil coupling mode, interference from electromagnetic energy emitted as a result of a wireless phone's display and keyboard backlight operation can cause interference that results in the hearing aid user experiencing distracting and sometimes painful buzzing noises.[71] Even if a wireless phone produces high audio volume or a strong magnetic field for acoustic or telecoil coupling, respectively, the interference described above could be overpowering and prevent the hearing aid user from using the digital wireless phone [72]

25 Changes to hearing aids have been made to increase these devices' ability to block electromagnetic energy, which is referred to as immunity Hearing aid manufacturers have focused on hardening the components in the hearing aid, which has resulted in improved immunity to both RF and non-RF sources of interference [73] In addition, the advances that are being made in digital hearing aids, which often do not experience interference issues, offer an opportunity to help control the interference that users of analog hearing aids may experience [74]

IV. ANALYSIS OF STATUTORY CRITERIA

26 We next set out our analysis of the four criteria Congress provided the Commission to determine whether revocation or limiting of the HAC Act exemption for wireless phones is warranted In the HAC Act, Congress specifically exempted phones used with public mobile services and phones used with private wireless services from having to be hearing aid compatible [75] We note, at the outset, that our rules provide that public mobile services are air-to-ground radiotelephone services, cellular radio telecommunications services, offshore radio services, rural radio services, public land mobile telephone services, and other common carrier radio communications services covered by Part 22 of our rules.[76] In 1994, Congress amended section 332 of the Communications Act of 1934, replacing private and public

---

[71] *See* Vickery Comments at 9, 11 *See* also University of Oklahoma Wireless EMC Center "Investigation of the Interaction Between CDMA Wireless Phones and Hearing Aids" (visited Jan 8, 2003) <http //www ou edu/engineering/emc/projects/CDG html>, H S Berger, TEM Consulting, "ANSI C63 19 Hearing Aid/Cellular Telephone Compatibility" (visited Feb 27, 2003) <http //www ieee.org/organizations/pubs/newsletters/emcs/sprng01/stan_act.htm> RF emissions from the antenna of a handset operating with a digital air interface are more likely to produce interference that renders a hearing aid inoperable than those from a handset operating with an analog air interface The Code Division Multiple Access (CDMA) digital interface provides the lowest levels of interference, with Time Division Multiple Access (TDMA), and TDMA variations such as GSM and Integrated Digital Enhanced Network (iDEN), producing the most interference *See* "Preliminary Results SHHH Mobile Phone Survey September 2002" (visited June 17, 2003) <http·//www shhh org/Advocacy/mppreliminarysurvey cfm>

[72] *See* D Mulvany and R Vickery, "An Analysis of Inductive Coupling and Interference Issues in Digital Wireless Phones Technically Feasible Solutions" (visited June 17, 2003) <http //hearingloss org/html/accdigwire752a html>

[73] *See* HIA Comments at 4, HIA Feb 15, 2002, *Ex Parte* Presentation at 1

[74] *See* "Power Support" (visited July 2, 2003) http //www oticon com/eprise/main/Oticon/com/SEC_Professional/PowerSupprt/AssistiveListeningDevise/CNT03_CellularPhones, "SELF HELP FOR HARD OF HEARING PEOPLE: FAQ Assisted Listening Device" (visited July 2, 2003) <http //www shhh org/faq/3 cfm?pf=1> Digital hearing aids, however, can be significantly more expensive than analog hearing aids *See* "Buy Hearing Aids" (visited June 26, 2003) <http //deafness about com/cs/buyaids/>

[75] 47 U S C § 610(c)

[76] 47 C F R § 68 3 Private mobile radio services are private land mobile radio services and other communications services characterized in our rules as private radio services *Id*

mobile service categories with two new categories of mobile services, commercial mobile radio service (CMRS) and private mobile radio service (PMRS), and treating CMRS providers, which includes PCS and cellular service providers, as common carriers [77] As we have done in the context of other proceedings, we conclude that the rules we adopt in this Order apply to telephones used with all wireless systems to the extent that they offer real-time, two-way switched voice service that is interconnected with the public switched network, and utilize an in-network switching facility which enables the provider to reuse frequencies and accomplish seamless handoffs of subscriber calls [78] Therefore, in addition to telephones used with broadband PCS,[79] we apply these rules to telephones used with other public mobile services, including Cellular Radio Telephone Service,[80] as well as Geographic Area Specialized Mobile Radio (SMR) Services and Incumbent Wide Area SMR Licensees in the 800 MHz and 900 MHz bands.[81]

27 The legislative history of the HAC Act indicates that Congress provided the exemption to wireless phones because it viewed them as complements, not substitutes, for wireline telephones [82] Congress authorized the Commission to revoke or limit that exemption upon a finding that 1) continuation of the exemption would have an adverse effect on hearing impaired individuals; 2) revocation or limiting of the exemption would be in the public interest, 3) compliance with the HAC Act requirements is "technologically feasible," and 4) compliance would not increase costs of wireless phones to such an extent that they could not be successfully marketed

28. We conclude that the HAC Act applies to both reduction of RF interference to hearing aids as well as providing inductive coupling capability for the hearing aid's telecoil In the legislative history of the HAC Act, Congress stated that the Act does not tie manufacturers to a particular technology and inhibit future development, instead, it sought only to require that telephones be compatible.[83] Congress specifically noted that, in an effort to avoid mandating any particular type of technology, "induction coupling and electromagnetic fields are not even mentioned" in the Act [84] This legislative history, coupled with the statutory language instructing the Commission to establish such regulations as are necessary to ensure reasonable access to telephone service by individuals with hearing disabilities,[85] compels our conclusion in this Order that both the reduction of RF interference and the provision of inductive coupling for the hearing aid's telecoil are necessary to ensure wireless phone compatibility with hearing aids

29 For the reasons set forth below, we find that continuation of the exemption would have an adverse effect on individuals with hearing disabilities Furthermore, we find that modifying the wireless phone exemption is in the public interest In addition, we find that it is both technologically feasible to

[77] *See* Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, Second Report and Order, 9 FCC Rcd 1411 (1994) We note that "commercial mobile radio service" is defined as a mobile service that is, "(a)(1) provided for profit (2) An interconnected service, and (3) Available to the public, or to such classes of eligible users as to be effectively available to a substantial portion of the public, or [the functional equivalent thereof] " *See* 47 C F R § 20 3

[78] *See* 47 C F R § 20 18(a) (identifying carriers subject to E911 rules), 47 C F R § 52 21(c) (identifying carriers subject to local number portability rules)

[79] Broadband PCS is described in Part 24, Subpart E of our rules, 47 C F.R §§ 24 200-24.253

[80] Cellular Radio Telephone Service is described in Part 22, Subpart H of our rules, 47 C F.R. §§ 22.900-22.967.

[81] These services are described in Part 90, Subpart S of our rules, 47 C F R §§ 90 601-90 699

[82] *See House Report* at 8

[83] *Id* at 8

[84] *Id* at 8

[85] 47 U S C § 610(a)

require compliance in the manner detailed in this Order, and that requiring such compliance will ensure that the digital wireless phones subject to this Order are marketable [86] And, finally, to the extent the modification of the exemption from the HAC Act for wireless phones facilitates usage by hearing aid users, we expect that individuals with cochlear implants will likewise benefit

A. Adverse Effect on Hearing Impaired Individuals

30 Based on the record in this proceeding, we conclude that continuing the exemption afforded to wireless phones under the HAC Act would have an adverse effect on individuals with hearing disabilities Consumers who use hearing aids or cochlear implants indicate they have had difficulty finding wireless phones they can use without suffering from annoying and sometimes painful interference, without resorting to expensive and cumbersome external attachments [87] Consumers state that it is becoming very difficult to find analog wireless phones and services, and they are unable to use most digital wireless phones because of the resulting interference [88] By not being able to take advantage of most newer, digital wireless phones and services, hearing aid users assert they cannot take advantage of the attractive pricing and service plans available to other consumers, many of which include free or reduced-price phones, because the phones offered do not work with their hearing aids [89] Some consumers point out that their lack of ability to use a digital wireless phone causes them problems in their employment, particularly since many employers now rely on digital phones and services to stay in contact with employees in the field [90] A few consumers reported difficulty in finding a phone that works with their hearing aids because they were unable to test the phone before purchasing it [91] Some consumers expressed a desire to use a wireless phone for emergency use while away from home, but are unable to find one they can use, which they believe puts them at greater risk than non-hearing aid users since they are unable to call 911 or for automotive assistance using a digital wireless phone [92]

31 Consumer advocacy groups assert that the market has not responded to the needs of individuals with hearing disabilities because of the relatively small size of the population of consumers that would benefit from hearing aid compatibility features in digital wireless phones (as compared to the size of the total population of digital wireless phone users).[93] However, these groups also note that the number of Americans with hearing disabilities is growing, and that the market for wireless phones and

[86] The HAC Act requires the Commission to determine whether "compliance with the requirements would not increase costs to such an extent that the telephones to which the exemption applies could not be successfully marketed " 47 U S C § 610(b)(2)(C)(iv)

[87] *See* AG Bell Comments at 6, SHHH Comments at 6, TDI Comments at 2-4, Anderson Comments, Angelo Comments, DeVilbiss Comments at 1, Diedrichsen Comments, Harper Comments, Klein Comments, MacKenzie Comments, Taylor Comments at 3, Vickery Comments at 3 *See also* Letter from Nancy A. Dietrich to Office of the Secretary, FCC, WT Docket No 01-309 (May 8, 2002), Letter from Lisa Devlin to Office of the Secretary, FCC, WT Docket No 01-309 (March 11, 2002)

[88] *See* SHHH Comments at 6-7, Consumer Action Network Comments at 2, TDI Comments at 2-5, Yagi Comments.

[89] *See* AG Bell Comments at 10, Klein Comments, NAD Comments at 1-2, TDI Comments at 5

[90] AG Bell Comments at 3, Consumer Action Network Comments at 2, NAD Comments at 2, TDI Comments at 5, MacKenzie Comments, McCarley Comments, Waldron Reply Comments at 1, Simmons Comments

[91] AG Bell Comments at 14, Anderson Comments at 1-2; MacKenzie Comments

[92] *See* Murphy Comments, Bahl Comments at 2, Mohney Comments, Schultz Comments, Vickery Comments at 5 There are also adverse effects upon the hearing population which flow from the wireless exemption *See* Arizona Commission for the Deaf and Hard of Hearing Comments at 3 (describing effects such as businesses' loss of resources, impacts on families and friends of individuals with hearing disabilities, as well as the need for support services when individuals are communicatively isolated)

[93] RERC Comments at 4

services would be increased if wireless phone manufacturers would improve access for hearing aid and cochlear implant users [94]

32 Some wireless industry commenters contend that removal of the exemption for wireless phones would not solve the hearing aid compatibility problem because it would not address issues associated with interference [95] A few commenters argue that the number of people who would benefit from removal of the exemption is relatively small, since such a small percentage of people have telecoils in their hearing aids, and many of them do not even use the telecoil functionality.[96] Because telecoil coupling is typically used by individuals with more severe hearing loss, these are the people who rely upon them the most for telecommunications Our rules should address the needs of these users since they are the most adversely affected by the exemption, despite the fact that they make up a minority of hearing aid users In addition, we do not simply remove the exemption for wireless phones and subject these phones to the wireline HAC requirements which, essentially, mandate only telecoil coupling Our modification of the exemption will benefit people who use their hearing aids for both inductive coupling and acoustic coupling, because our rules will require both reduction of RF interference to hearing aids as well as providing inductive coupling capability for the hearing aid's telecoil As a result, our rules could benefit the entire population of hearing aid users, which is estimated to be approximately six million people

33 We are not persuaded by the other arguments against modifying the exemption Some commenters claim that the compatibility problem should be solved by only requiring hearing aid manufacturers to increase the immunity of hearing aids.[97] However, this would not address the need for telecoil coupling capability and, while hearing aid immunity has been significantly improved in recent years, it does not appear to be possible to completely shield against all RF interference from digital wireless phones.[98] In addition, contrary to the assertions of some industry commenters, we do not find the security concerns presented by providing telecoil coupling to be significant.[99] Eavesdroppers would need to be within the magnetic field generated by the phone, which is typically about 12 to 18 inches from the handset speaker.[100]

34 While we recognize that the wireless industry has made some efforts to address the needs of individuals with hearing disabilities,[101] we believe that maintaining the exemption for wireless phones

[94] *See* AG Bell Comments at 5-6, SHHH Comments at 7, TDI Comments at 4

[95] CTIA Comments at 3-8, TIA Comments at 5

[96] *See* AAES Comments at 3-6, CTIA Comments at 9, Sprint PCS February 4, 2003, *Ex Parte* at 5

[97] *See* Sprint PCS Comments at 11-14, TIA Comments at 13-22, Nextel Reply Comments at 4, 7-8

[98] *See* HIA Feb 20, 2003, *Ex Parte* Presentation at 2-3; Cochlear Americas Comments at 3

[99] *See* AAES Comments at 8, Cingular/Siemens October 23, 2002, *Ex Parte* Letter at 11

[100] *See* ANSI C63 19 at 10 *See also* "Induction Loop Systems" (visited July 7, 2003) <http://www dt4u com/dtsystems/loopmed htm> and S.C Ewens, "LIMITS OF INDUCTIVE COUPLING IN HEARING AIDS," *TELEPHONES AND HEARING AIDS PROCEEDINGS OF COST 219 SEMINAR, The Hague, 17th of March 1993*, Commission of the European Communities Information Technologies and Sciences, "telecommunications and disability," Edited by Patrick R W. Rowe (visited June 26, 2003) <http //www stakes fi/cost219/HAGUE93 DOC>

[101] Representatives of the wireless industry participated in the ANSI C63.19 Task Group which developed the standard *See* ANSI C63 19 at iii-iv (participants included Ericsson, Motorola, Nokia, Pacific Bell Mobile Services, Qualcomm, and Siemens) In addition, several wireless handset manufacturers state that they have begun testing under ANSI C63 19, and some have made efforts to produce lighter, less cumbersome accessories For example, Nokia reports that it has updated its neck loop for inductive coupling to eliminate the need for separate batteries CTIA has established an Internet web site, which is available at <www accesswireless org>, to provide information on wireless phones that provide hearing aid compatibility characteristics *See* CTIA June 13, 2003, *Ex Parte* at 1-2

from the HAC Act would adversely affect hearing aid users In light of the migration of consumers to more efficient, feature-rich, and lower-cost digital wireless phones and services, we believe that maintaining the exemption for wireless phones would prevent hearing aid users from taking advantage of these devices and services In addition, the market transition from analog to digital services, recognized by the Commission's decision to sunset the analog service requirements imposed on wireless carriers, could restrict the choices for telecommunications services that are available to individuals with hearing disabilities, unless the HAC Act's exemption for wireless phones is modified or eliminated [102] These constitute adverse effects that would be caused by continuing the wireless phone exemption from the HAC Act

B. Public Interest

35 Based on the record in this proceeding, and in light of the adverse effects of continuing the exemption described above, we conclude that the public interest is served by modifying the exemption afforded wireless phones under the HAC Act As commenters to this proceeding have affirmed, greater access to digital wireless service for individuals with hearing disabilities will enable them to benefit from this technology, which has influenced Americans' work and social lives, and that benefit will inure to all consumers of telecommunications [103] In other orders, the Commission has recognized such benefits. For example, in its Order implementing section 255 of the Telecommunications Act, the Commission stated that ensuring greater access to a particular group of telecommunications consumers creates benefits that flow to all consumers of telecommunications services.[104] Moreover, it is important to preserve access to wireless telecommunications for individuals with hearing disabilities, particularly in view of the public safety benefits offered by these services Over the last 10 years, there has been more than a 10-fold increase in the number of wireless 911 calls, and this trend is likely to continue [105] As the general public increasingly relies on wireless phones to obtain emergency services, individuals with hearing disabilities should also be able to take advantage of the safety benefits of wireless services by having access to digital wireless phones that work effectively with hearing aids

36 The rise in use of digital wireless service is well documented. As the Commission noted in the *Eighth Competition Report*, digital technology is now dominant in the wireless telephone sector, with approximately 125 million subscribers, far surpassing the 17 million analog subscribers.[106] Digital wireless technologies enable wireless service providers to more efficiently use their spectrum, which in turn allows them to offer their customers relatively inexpensive bundles of minutes, more enhanced services, such as text messaging, and wireless data and mobile Internet offerings.[107] These offerings have allowed wireless telecommunications to evolve from what was once considered a complementary business service to a mass market consumer offering that delivers an essential service, telecommunications, through a platform that offers users the benefits of mobility and greater independence Wireless services also offer users greater access to emergency services. As evidenced by the continued growth in the number of wireless subscribers, consumers are realizing these benefits, often

[102] *See Analog Sunset Order*, 17 FCC Rcd 18401, 18417

[103] AT&T Wireless Comments at 3, AG Bell Comments at 4, Consumer Action Network Comments at 2

[104] Implementation of Sections 255 and 251(a)(2) of the Communications Act of 1934, As Enacted by the Telecommunications Act of 1996 Access to Telecommunications Service, Telecommunications Equipment and Customer Premise Equipment by Persons With Disabilities, WT Docket No 96-198, Report and Order and Further Notice of Inquiry, 16 FCC Rcd 6417, 6420 (1999) (*Section 255 Order*)

[105] NENA Wireless 9-1-1 Overview, *see supra* note 13

[106] *See supra* note 11, *Eighth Competition Report* at section II C 1 b.(1)

[107] *See supra* note 12, *Seventh Competition Report*, 17 FCC Rcd 12985, 13009

considering their wireless phone to be their primary phone [108] For these reasons, access to digital wireless service for the country's approximately six million hearing aid users is necessary to facilitate their full participation in our society, and we therefore conclude that it is in the public interest that the exemption afforded to wireless phones under the HAC Act be modified As the Commission has recognized in other proceedings, increasing the number of people connected to the telecommunications network makes the network more valuable to all of its users [109]

37 In addition to the benefits to hearing aid wearers that will accrue from modifying the exemption for wireless phones, we believe increased accessibility to digital wireless telecommunications will result in benefits for all consumers Even people who do not wear hearing aids would benefit from the spectrum usage efficiencies realized by the increased use of digital wireless phones rather than the continued use of analog wireless phones [110] Also, measures to redirect RF energy could extend phone battery life for all users [111] In addition, the wireless industry would benefit from the business opportunity in serving the expanding market segment comprised of individuals with hearing disabilities, and employers of individuals with disabilities would benefit from improved communication with employees in the field We also anticipate that, based on similarities between the experiences of cochlear implant users and hearing aid users when using digital wireless phones,[112] any handset changes that are made as a result of modifying the exemption will likewise benefit cochlear implant users [113] In sum, the public interest would be served by modifying the HAC Act's wireless phone exemption.

C. Technological Feasibility

38 Based on the record in this proceeding, we also find that it is technologically feasible for digital wireless phones to comply with the requirement that they be hearing aid compatible Below, we describe some of the technological aspects involved in achieving compatibility between digital wireless phones and hearing aids, and we detail the various parts of the technological feasibility criterion to establish such a requirement

39. ANSI C63 19 Technical Standard Fundamental to deciding to modify the exemption on grounds of technological feasibility is the requirement that there be an established technical standard.[114] As discussed above, since 1996, the Commission, in conjunction with various industry participants and consumers, has been working to establish a technical standard that would allow digital wireless phones to work properly with hearing aids One product of the HAC Summit of 1996 was the establishment of a technical working group, which led to the formation by ANSI C63 of Task Group C63.19 [115] ANSI C63 charged the Task Group with developing a standard for methods of measurement and defining the limits

---

[108] *See supra* note 10, *Seventh Competition Report*, 17 FCC Rcd 12985, 13017 (*citing* a poll that indicates one in five wireless telephony users considers their wireless phone to be their primary phone)

[109] *See* Federal-State Joint Board on Universal Service, Report and Order, 12 FCC Rcd 8776, 8783 (1997) ("Increasing subscriber ship also benefits society in ways unrelated to the value of the network per se For example, all of us benefit from the widespread availability of basic public safety services, such as 911 ")

[110] *See Analog Sunset Order*, 17 FCC Rcd 18401, 18406

[111] *See* F M Caimi, Ph D , Senior Scientist, "MLA Antennas - Physically Small, Electrically Large" (visited March 5, 2003) <http //www skycross com/MLA_antenna asp>

[112] *See* Cochlear Americas May 16, 2003, *Ex Parte* at 2

[113] Cochlear implant manufacturers indicate that they are beginning to incorporate telecoils into newer cochlear implant models *See* Cochlear Americas May 16, 2003, *Ex Parte* at 2 As a result, cochlear implant users will benefit from telecoil coupling capability as well as reduced RF emissions from digital wireless handsets

[114] *See* 47 U S C § 610(b)(1)(B)

[115] ANSI C63 is the Accredited Standards Committee on Electromagnetic Compatibility

for hearing aid compatibility and accessibility to wireless telecommunications [116] Task Group C63 19, which included wireless carriers, digital wireless handset manufacturers, and hearing aid manufacturers, as well as representatives from the FCC and Food and Drug Administration (FDA), prepared and adopted by an almost unanimous vote[117] a standard that is predictive of the successful use of digital wireless phones with hearing aids [118]

40 To use a digital wireless phone with a hearing aid or cochlear implant in acoustic coupling mode, RF interference and other EMI from the wireless phone must be controlled Based on recommended audio signal-to-interference ratios and other assumptions about wireless phones' performance, ANSI C63 19 specifies ratings for digital wireless phones, U1 through U4, based on their RF emission levels, with U1 being the highest emissions and U4 the lowest emissions The standard also provides a methodology for rating hearing aids from U1 to U4 based on their immunity to interference, with U1 being the least immune and U4 the most immune To determine whether a particular digital wireless phone will not interfere with a particular hearing aid, the immunity rating of the hearing aid is added to the emissions rating of the wireless phone A sum of 4 would indicate that the wireless phone is usable, a sum of 5 would indicate that the wireless phone would provide normal use, and a sum of 6 or greater would indicate that the wireless phone would provide excellent performance with that hearing aid [119]

41 Reduced RF emissions are also needed to improve inductive coupling with hearing aid or cochlear implant telecoils In addition, to use a wireless phone with a hearing aid or cochlear implant in telecoil coupling mode, without employing an accessory device (*e g.*, a neck loop), the voice coil of the wireless phone's speaker or a separately installed coil must generate an audio signal-based magnetic field of sufficient intensity and frequency response for reception by the telecoil and conversion into sound by the hearing aid speaker or into digital signals by the cochlear implant processor If the magnetic field's intensity is too low, a hearing aid user may attempt to compensate by increasing the sensitivity of the telecoil But this could introduce interference from undesired electromagnetic fields not previously detected, such as from operation of the wireless phone's display and keyboard backlight.[120]

42 The ANSI standard specifies the axial field and radial field intensity of the audio signal's magnetic field required for satisfactory operation of digital wireless phones with hearing aids in telecoil mode The standard also specifies ratings for the magnetic field quality of digital wireless phones as well as the immunity of hearing aids to undesired magnetic fields, U1T through U4T.[121] To determine whether a particular digital wireless phone will function with a particular hearing aid in telecoil mode, the immunity rating of the hearing aid is added to the magnetic field rating of the wireless phone. A sum of 4 would indicate that the wireless phone is usable, a sum of 5 would indicate that the wireless phone would provide normal use, and a sum of 6 or greater would indicate that the wireless phone would provide excellent performance with that hearing aid in telecoil mode [122]

43 ANSI C63 19 is a detailed standard that is highly predictive of the usability of compatible wireless phones with sufficiently immune hearing aids, a point which the Telecommunications Access

[116] *See* ANSI C63 19 at iii

[117] HIA *Ex Parte*, filed Mar 26, 2003 (indicating that HIA voted against ANSI C63 19, but expressing support for its application in today's manufacturing environment)

[118] *See* ANSI C63 19 at 1-2

[119] *See* ANSI C63 19 at 38-39

[120] *See supra* note 72

[121] *See* ANSI C63 19 at 40

[122] *See* ANSI C63 19 at 39

Advisory Committee to the United States Architectural and Transportation Barriers Compliance Board makes in declaring ANSI C63 19 to be a success [123] Even though the Commission expressed the view in the *Notice* that ANSI C63 19 did not appear to constitute an established technical standard within the meaning of the HAC Act,[124] through comments submitted on the record by ANSI ASC C63 SC8 and other information gathered during the course of this proceeding, we now believe the standard does constitute a workable technical standard to produce digital wireless phones that can be used effectively with hearing aids [125] ANSI C63 19 was made publicly available shortly before the adoption of the Notice, and Commission staff had a limited time within which to evaluate its applicability and usefulness for purposes of determining whether it was a standard that would be technologically feasible for digital wireless phones to meet We have since had a more thorough opportunity to evaluate the standard and to obtain additional information from persons involved with the standard's development and initial testing, and it appears to be a workable technical standard for purposes of lifting the exemption for digital wireless phones [126] We, therefore, find that the ANSI C63 19 standard for digital wireless phone compatibility with hearing aids is an established technical standard, as required by the HAC Act

44 Feasibility of Meeting the ANSI Standard In addition to requiring an established standard, the technological feasibility criterion of the HAC Act requires that wireless phones be capable of meeting that standard In the record, manufacturers, including Motorola and Nokia, confirm that certain of their digital wireless phones across four air interfaces currently meet the U3 or higher rating required under the ANSI C63 19 standard for good performance with compliant hearing aids [127] Because shielding can reduce the RF energy directed toward a user, such techniques have the potential to permit wireless phones to achieve the U3 or higher rating, and thus reduce the interference to hearing aids [128] Contrary to Sprint PCS's assertion that reducing EMI from wireless phones will significantly reduce industrial design options,[129] there are a number of steps manufacturers might take to reduce EMI without significantly affecting handset designs For example, printed circuit board shielding and shunt traces can effectively reduce EMI-causing emissions from printed circuit boards.[130] Also, cell phone enclosure shielding has evolved from plated metal, to plated plastic, to today's robotically-painted and EMI-gasketed parts, which can significantly reduce EMI [131] As Sprint PCS states, some metals used for shielding, such as copper,

---

[123] *See* ANSI ASC C63 SC8 Comments at 16 (stating that tests indicate the standard is 96 percent predictive of usability)

[124] *Notice*, 16 FCC Rcd 20558, 20560

[125] *See generally* ANSI ASC C63 SC8 Comments, AAES Comments at 9-10

[126] *See* ANSI ASC C63 SC8 March 21, 2003, *Ex Parte* Letter at 2-3, Motorola May 5, 2003, *Ex Parte* Letter at 1, Nokia July 1, 2003, *Ex Parte* Presentation at 8

[127] These air interfaces include CDMA, GSM, iDEN, and TDMA *See* Motorola January 31, 2003, *Ex Parte* at 16, and Nokia July 3, 2003, *Ex Parte* Letter

[128] *See* Vickery Comments at 7-10, L Kozma-Spytek, M A Research Audiologist, Gallaudet University Technology Access Program, Washington, D C , "Digital Wireless Telephones and Hearing Aids" (visited June 17, 2003) <www audiology com>

[129] *See* Sprint Feb 4, 2003, *Ex Parte* Presentation at 4

[130] The use of shunt traces, which are alternative paths for interfering currents, is reportedly one of the most effective means for reducing emissions from printed circuit boards *See* S. A. Bokhari, "Analysis of the effect of Shunt Traces on the Radiation from Printed Circuit Boards," *Proceedings of the 1998 IEEE International Symposium on Electromagnetic Compatibility*, Vol 1, July 1998, at 621

[131] *See* N Quesnel, "Optimizing EMI Shielding for Wireless Systems" (visited Feb 25, 2003) <http //www chomerics com/tech/EMI_shld_%20Artcls/Wireless%20EMI%20Shielding.pdf> Ericsson has developed a shield for its model T10s wireless phone that reduces the specific absorbed radiation by approximately 87 percent, while actually increasing the relative radio frequency power transmitted by approximately 45 percent *See* M I Manning and M Densley, "SARTest Report 0113 June 2001 On the Effectiveness of Various Types of

(continued..)

readily oxidize upon exposure to the environment [132] However, techniques have been developed to prevent such metals from oxidizing [133] Sprint PCS also notes that a capacitor intended to filter audio signal EMI would also reduce the gain of the audio signal [134] We agree, because if the frequency of the undesired signal is at or near that of the desired signal, a filter designed to attenuate the undesired signal will also attenuate the desired signal [135] Techniques other than filtering could be used to eliminate audio signal EMI [136]

45 Although direct current (DC) wireless phone batteries do not typically produce EMI,[137] alternating current (AC) elsewhere in the phone, such as for the RF amplifier, the keypad light, and the display screen light can generate EMI to hearing aids Techniques to mitigate such interference include passive inductive cancellation,[138] as well as the shielding techniques previously discussed. Also, several mobile phone manufacturers, including Kyocera, LG, Samsung, and Sanyo, are currently producing wireless phones with a programmable backlight setting that allow a user to select how long the display screen and keypad remain backlit after any key press is made [139] As more manufacturers follow suit, then this source of interference to hearing aids users will be eliminated because consumers will be able to turn off or otherwise control the backlight

46 In addition, we note that some wireless carriers are considering the use of directional antennas to improve network performance,[140] and that these antennas may also reduce the RF interference

---

(continued from previous page)
Mobile Phone Radiation Shields" prepared for the United Kingdom Department of Trade and Industry (visited Feb 25, 2003) <http //www/dti gov uk/cii/docs/R500016att pdf> at 7

[132] *See* Sprint February 4, 2003, *Ex Parte* at 5

[133] Typically, a nickel coating is applied over the copper, or other susceptible metal, to protect it from environmental exposure *See* B C Jackson and G. Shawhan, "Current Review of the Performance Characteristics of Conductive Coatings for EMI Control," *Proceedings of the 1998 IEEE International Symposium on Electromagnetic Compatibility*, Vol 1, July 1998, at 568

[134] *See* Sprint February 4, 2003, *Ex Parte* at 5 Capacitor filters have gain that is dependent on signal frequency.

[135] *See* K Lacanette, "A Basic Introduction to Filters – Active, Passive, and Switched-Capacitor," *National Semiconductor Corporation Application Note 779*, April 1991 (visited March 11, 2003) <http //www swarthmore edu/NatSci/echeevel/Ref/DataSheet/IntroToFilters pdf>

[136] *See* T Raper and S Knauber, "Designing for Electromagnetic Interference (EMI) Compliance," March 1999 (visited June 26, 2003) <http //www amd com/epd/processors/2.16bitcon t/16bitmc/22507/22507 pdf>

[137] *See* Sprint PCS February 4, 2003, *Ex Parte* at 5

[138] Inductive field cancellation is accomplished by configuring conductors in such a way so the positive field generated by one conductor is nearly cancelled by the negative field produced by the other conductor *See Ex Parte* Letter from George DeVilbiss to Edmond Thomas, WT Docket No 01-309 (filed February 26, 2003) *See also* P Giddings, PE, "Getting a Perspective on Noise in Audio Systems" (visited June 26, 2003) <http //www engineeringharmonics com/papers/gpnas htm>

[139] *See* Sprint February 4, 2003, *Ex Parte* Letter at 5 *See also* Samsung March 3, 2003, *Ex Parte* Letter at 1

[140] Some carriers are considering deploying directional phone and base stations antennas in so-called "diversity schemes" in order to improve wireless system performance and reduce the number of base stations needed. *See* D. McDonough, Jr , "Building a Better Wireless Antenna," *Wireless News Factor*, June 5, 2002 (visited March 5, 2003) <http //www skycross.com/WNF_06052002 asp> *See also* C Beckman, "Development Trends in Antennas for Mobile Phones," Portable 2001 Conference, February 13-15, 2001, San Jose, CA (visited Feb 19, 2003) <http //www s3 kth se/signal/edu/seminar/01/Portable2000 pdf>, J H Winters, "Smart Antennas for Wireless Systems," *IEEE Personal Communications*, February 1998 at 23-27, F Viquez, "Smart Antenna Deployment in Next-Generation Wireless Systems" (visited Feb 19, 2003) <http //www base-earth.com/march-april2002/allied html>

experienced by some hearing aid users A few vendors are currently working to develop accessory directional antennas that connect to the hands-free antenna port on the back of some handset models, and which are designed to reduce the level of RF emissions directed toward the hearing aid [141] Some commenters claim that directional antennas could significantly impact wireless networks' performance by affecting initial call connection attempts and later handoffs, potentially requiring considerable changes to networks' configurations and operation [142] Contrary to these assertions, however, directional antennas have the potential to help mitigate the effects of multipath, improve frequency bandwidth performance, achieve higher gain, and provide better directional control over emissions [143] Although handsets that employ directional antennas may need to be slightly reoriented when used in certain locations, techniques such as antenna diversity are being considered to combat large-scale fading effects caused by shadowing from large obstacles (*e g* , buildings or other terrain features) [144] Because such antennas have the potential to significantly reduce the RF interference to hearing aids, as well as provide efficiency benefits both to the wireless network and to battery life, there are several benefits that could be gained from their increased use in handsets

47 We note that some commenters claim that the Commission's rules appear to prohibit the use of directional wireless phone antennas [145] Section 24.232(b) limits the power for broadband PCS mobile stations to 2 watts peak Effective Isotropic Radiated Power (EIRP), and the equipment must employ means to limit the power to a minimum necessary for successful communications [146] A directional antenna manufacturer, Myers Johnson, Inc. (MJI), has filed a petition for revision of this rule MJI believes that the rule, as it is written, prohibits the use of directional antennas [147] We disagree. The EIRP requirement does not in any way prohibit employing wireless phone directional antennas We do not interpret the rule to require antennas to radiate only in an isotropic pattern. Instead, section 24.232 only establishes the maximum power that can be transmitted from wireless phones. As a result, we deny Myers Johnson's petition to modify section 24.232

48 In addition to employing techniques to reduce interference caused by digital wireless phones to hearing aids, we also believe it is technologically feasible for digital wireless phones to be made capable of inductive coupling with the hearing aid's telecoil (*i.e*, to meet a U3T rating). Nokia indicates that initial testing demonstrates that some of its phones meet the U2T to U4T magnetic field quality rating [148] Although some wireless industry parties contend that a new standard for inductive coupling

[141] *See* Myers Johnson Petition at 3, Damax Oct 21, 2002, *Ex Parte* at 1-2

[142] *See* CTIA Comments at 23, Sprint Feb 4, 2003, *Ex Parte* Presentation at 5

[143] *See* note 140, *supra*

[144] *See* A J Paulraj, D Gesbert, C Papadias, "Smart Antennas for Mobile Communications," *Paulraj, Gesbert, Papadias Encyclopedia for Electrical Engineering*, John Wiley Publishing Co , 2000 (visited March 5, 2003) <http //heim ifi uio no/~gesbert/papers/encyclopedia_chapter pdf>

[145] See Cingular/Siemens January 22, 2003, *Ex Parte* at 5 In addition, stating its belief that the section 24.232 of our rules restricts the use of directional antennas in wireless phones, Myers Johnson, Inc , has petitioned the Commission to amend section 24 232 of our rules to limit the power supplied to the antenna to 32 dBm (1.584 Watts), and to require the equipment to employ the means to limit the power to the minimum necessary for successful communications *See* Myers Johnson Petition at 1-4 (filed Jan 27, 2003)

[146] *See* 47 C F R § 24 232(b)

[147] *See* Myers Johnson Petition at 1-4

[148] Nokia July 1, 2003, *Ex Parte* at 8 *See also* Nokia July 3, 2003, *Ex Parte* Letter (confirming that some of its phones meet the U3 and U3T criteria)

needs to be developed,[149] the ANSI C63 19 standard recommends specific magnetic intensity levels and signal plus noise-to-noise ratios (*i e* , quality levels) for successful inductive coupling with hearing aids [150] The magnetic field specified in ANSI C63 19 can be provided by internal means via the voice coil of a wireless phone's dynamic speaker [151] Alternatively, to increase durability and battery life and to decrease component weight, a wireless phone manufacturer may elect to incorporate an induction coil in addition to a non-inductive speaker assembly, such as a piezoelectric speaker, to provide the required magnetic field ANSI C63 19 recommends that the location of the additional coil should be near but not necessarily centered on the speaker opening [152] We note that some Samsung digital wireless phone models have designs which approximate the section 68 316 requirements for wireline hearing aid compatibility, and this appears to promote telecoil coupling capability [153] In addition, consumers have reported finding some digital wireless phones that provide adequate telecoil coupling capability [154] We also note that Audex Inc has developed an external device which, when used with a digital wireless phone, generates a magnetic field that is sufficient to provide telecoil coupling capability [155] This device is currently employed as an external attachment to certain handsets, fitting between the phone's body and the battery [156] Alternatively, its functionality could be incorporated into a wireless handset itself [157]

49 Because we believe that the U3 and U3T performance levels for normal use specified in ANSI C63 19 constitute an established standard which digital wireless phones currently available on the market meet, we conclude that it is technologically feasible for certain digital wireless phones to be made hearing aid compatible The record evidence indicating that digital wireless phones can meet the U3 and U3T performance levels in the ANSI C63 19 standard is sufficient evidence to establish the requirement that such phones be capable of meeting the established technical standard. We recognize that, as the industry engages in testing and design work geared to comply with the U3 and U3T performance levels, the standard may need to be revisited. In addition, alternative approaches to the problem of providing greater wireless accessibility for hearing aid users should be explored. We encourage these steps as part of an evolutionary process that will ultimately lead to increased wireless communications accessibility for individuals with hearing disabilities.

[149] *See* Letter from Diane Cornell, CTIA, to Marlene Dortch, FCC, WT Docket No 01-309 at 2-3 (June 13, 2003) (CTIA June 13, 2003, *Ex Parte* Letter), Cingular May 16, 2003, *Ex Parte* Letter at 2, Motorola May 5, 2003, *Ex Parte* Letter at 1, Sprint July 3, 2003, *Ex Parte* Letter at 1

[150] *See* ANSI C63 19 at 40-42

[151] *See* CTIA Comments at 5, Motorola Comments at 4, Sprint PCS Comments at 28 *See also* "Motorola Products and Services Features" (visited May 6, 2003)
<http //commerce motorola com/consumer/QWhtml/accessibility/features html>

[152] *See* ANSI C63 19 at 35

[153] *See Ex Parte* Letter from Muzibul H Khan, Samsung, in WT Docket No 01-309 (March 3, 2003).

[154] *See* SHHH September 12, 2002, *Ex Parte* Presentation, Preliminary Results of SHHH Mobile Phone Survey at 2 and Comments on Accessories from Survey Respondents at 1, Dana Mulvany Reply Comments at 1, Letter from Susan Matt to Washington State SHHH Members (visited June 17, 2003) <http //www wasa-shhh org/telecommunications htm>

[155] *See* Audex Aug 2, 2002, *Ex Parte* Letter at 1

[156] The Audex CHAAMP accessory is currently designed to work with Nokia handsets *See* Audex Aug. 2, 2002, *Ex Parte* at 1

[157] *See* Audex Aug 2, 2002, *Ex Parte* at 1

D. Marketability

50 In order to modify the exemption contained in the HAC Act for wireless phones, the Commission must also find that compliance "would not increase costs to such an extent that the telephones could not be successfully marketed."[158] Based on the record in this proceeding, we further find that it is possible for digital wireless phones to comply with the hearing aid compatibility requirement and that such a requirement would not increase the costs of such phones to such an extent that they could not be successfully marketed

51 There is evidence on the record that supports a finding that compliance with U3 and U3T performance levels of the ANSI C63 19 standard is not only technologically feasible, but that such compliance can be achieved in competitively-priced digital wireless phones As stated above, a number of manufacturers have asserted in this proceeding that they currently offer customers digital wireless phones that meet the U3 performance level of the ANSI C63 19 standard.[159] These entities manufacture digital wireless phones over all air interfaces and these digital wireless phones incorporate a variety of features Also, manufacturers are producing digital wireless phones that approximate the magnetic field intensity for wireline telephones specified in section 68 316 of our rules.[160] While the U3T performance level goes beyond the wireline standards contained in our rules, we do not believe that digital wireless phones that meet the U3T performance level would be too costly to market. As we discussed above, modifications to the handset could yield the necessary magnetic field for inductive coupling, and it does not appear that such modifications will cause significant research and development or production costs.[161]

52 In addition, as the number of hearing aid and cochlear implant users continues to increase over the next several years,[162] we expect that demand for hearing aid-compliant handsets also will increase This increased demand should drive down the costs of production for hearing aid-compliant phones Moreover, to the extent manufacturers incorporate hearing aid compatible functionality into greater numbers of digital wireless handsets, this should also drive down the cost per unit and increase the likelihood that these phones could be successfully marketed Based on this evidence, we conclude that the "marketability" criterion for modifying the exemption is met [163]

V. REQUIREMENTS FOR HEARING AID COMPATIBILITY OF WIRELESS PHONES

53 In this Section, we detail the requirements that we adopt in this Order and provide a timeframe for implementation of those requirements. We adopt certain performance levels set forth in ANSI C63.19 as a technical standard to govern digital wireless phone compatibility with hearing aids. Within two years, we require each digital wireless phone manufacturer to make available to carriers and require each carrier providing digital wireless services to make available to consumers at least two handset models for each air interface it offers[164] which provide reduced RF emissions ("U3" rating) to

---

[158] 47 U S C § 610(b)(2)(C)(iv)

[159] *See supra* note 127, Motorola Jan 21, 2003, *Ex Parte* Presentation at 14, Nokia July 3, 2003, *Ex Parte* Letter

[160] *See* Samsung March 3, 2003, *Ex Parte*, 47 C F R § 68 316

[161] *See supra* para 48

[162] *See* SHHH Comments at 2 (number of individuals with hearing loss is increasing as a result of noise exposure and aging of society), Cochlear Americas May 16, 2003, *Ex Parte* at 1 (number of individuals who are candidates for cochlear implantation is growing by approximately 20 percent each year)

[163] *See* paras 78-79, *infra* (discussing costs and benefits of our actions as required by HAC Act, 47 U S.C §610(e))

[164] Under our requirements, digital wireless service providers are required to offer consumers at least two compliant phone models for each air interface they offer, but not necessarily two for every manufacturer they carry

enable acoustic coupling [165] Also within two years, we require each Tier I wireless carrier providing digital wireless services to make available to consumers at least two handset models for each air interface it offers to provide reduced RF emissions ("U3" rating) or 25 percent of the total number of phone models it offers, whichever is greater Within three years, we require each digital wireless phone manufacturer to make available to carriers and require each carrier providing digital wireless services to make available to consumers at least two handset models for each air interface it offers which provide telecoil, or inductive, coupling ("U3T" rating) We adopt a *de minimis* exception to these requirements for certain digital wireless phone manufacturers and carriers

54 To enhance consumer choice, we encourage digital wireless phone manufacturers and service providers to offer at least one compliant handset that is a lower-priced model and one that has higher-end features By February 18, 2008, the date on which wireless carriers may discontinue providing analog service in accordance with the *Analog Sunset Order*,[166] we require 50 percent of all digital wireless phone models offered by a manufacturer or carrier to be compliant with the reduced RF emissions requirements Additionally, we require manufacturers to label the handsets accordingly, and we require carriers to make available the performance rating of the compliant handsets We require wireless carriers and digital wireless handset manufacturers to report semiannually (every six months) on efforts toward compliance during the first three years, then annually thereafter through the fifth year of implementation. We commit the Commission staff to deliver a report to the Commission shortly after three years from the effective date of this Order so we can examine the impact of these requirements This report will form the basis for the Commission to initiate a proceeding soon after the report is issued to evaluate whether to increase or decrease the 2008 requirement to provide 50 percent of phone models, whether to adopt implementation benchmarks beyond 2008, and whether to otherwise modify the implementation requirements. We encourage hearing aid manufacturers to label their pre-customization products according to the ANSI standard And, finally, we encourage phone manufacturers and service providers to engage in outreach efforts intended to educate the public, audiologists, hearing aid dispensers, and retail personnel concerning using digital wireless phones with hearing aids These actions are described in greater detail below

A. Adoption of ANSI C63.19 Performance Levels as the Applicable Technical Standard

55 As discussed above in Section IV C, the ANSI C63 19 standard is the most relevant technical standard currently available for measuring whether a particular digital wireless phone is likely to work with a hearing aid with particular characteristics This standard was developed by representatives of a number of interested parties, including wireless carriers, digital wireless phone manufacturers, and hearing aid manufacturers, as well as by representatives from the FCC and FDA. While we recognize that some parties have asserted that ANSI C63.19 is not a perfect tool for ensuring that any given hearing aid will work with a particular digital wireless phone,[167] we believe the standard presents a workable approach to measuring levels of interference digital wireless handsets cause to hearing aids, as well as for measuring the immunity of hearing aids In addition, ANSI C63 19 sets forth obtainable performance characteristics for wireless phones and provides a reasonable methodology for predicting the likelihood that two devices will work together

[165] *See supra* at para 22 (explaining that acoustic coupling involves all sounds being received by the hearing aid's microphone, being converted to electrical signals and amplified as needed, and then being converted back into sound through the hearing aid's speaker)

[166] *Analog Sunset Order*, 17 FCC Rcd 18401, 18419 *See* para 21, *supra* (describing process by which carriers may discontinue providing analog service)

[167] *See* Sprint PCS Comments at 14-16, Sony Ericsson March 13, 2003, *Ex Parte* Presentation at 4, Nokia April 10, 2003, *Ex Parte* Presentation at 9, Samsung Telecommunications America March 21, 2003, *Ex Parte*, Letter at 2

56 As discussed above, a digital wireless handset which meets a U3 rating for reduced RF interference and a U3T rating for telecoil coupling would likely result in normal performance with a U2-rated hearing aid and in excellent performance for a person using a U3-rated hearing aid [168] Hearing aid manufacturers indicate that the majority of hearing aids being produced today are capable of meeting an immunity level that would result in good performance with a digital wireless phone meeting the U3 or U3T requirements under the ANSI standard As a result, we find that a requirement that handsets meet a U3 and U3T rating under ANSI C63 19 will facilitate successful combinations of hearing aids and digital wireless phones, and should be mandated The record indicates that there are some digital wireless handsets presently on the market that meet the U3 level, and while further testing is necessary, it appears that there are some handsets which produce a sufficient electromagnetic field to permit telecoil coupling with hearing aids [169] This may mean that these handsets either already do meet the U3T rating under ANSI C63 19, or that they could feasibly meet that rating with some minor modifications

57 Some wireless phone manufacturers have questioned whether handset compliance with ANSI C63 19 will ensure a successful consumer experience in all cases, particularly since we are not imposing immunity requirements on hearing aid manufacturers [170] HIA has expressed concern regarding the labeling of hearing aids, particularly since they are highly customized for each person's physiology and individual hearing loss and it is difficult to predict whether a particular hearing aid will provide the same level of immunity for every user [171] Nonetheless, by requiring digital wireless phones to provide a reduced level of RF emissions and to provide telecoil coupling capability as described in this Order, we believe that a greater number of hearing aid and cochlear implant users will be able to find digital wireless phones that will work for them Also, it appears that, by meeting the ANSI C63.19 performance standards, compliant digital wireless phones will have improved audio quality. As a result, we do not need to impose rules concerning volume control of wireless phones like those governing wireline phones.

58 Hearing aid manufacturers have increased the immunity of hearing aids in recent years, and they state that, if a digital wireless handset meets the U3 or U3T or better rating under ANSI C63.19, "HIA member companies can identify hearing aids that have been designed to meet higher immunity levels as compatible with digital handsets that meet [the U3 and U3T requirements.] Further, HIA members, as a policy, will continue to provide at least a 30-day trial period on hearing aids respective companies consider to be compatible and offer a full refund should the hearing aid not meet the customer's expectations "[172] HIA has committed that, in the event we adopt such performance requirements for digital wireless phones, its members would allow the user a 30-day trial period, and the manufacturer would take the hearing aid back for a full refund "if it cannot be adjusted, re-manufactured, or replaced to satisfy the needs of the user "[173]

---

[168] ANSI C63 19 at Section 7 2, Table 1 (p 39)

[169] *See* SHHH September 12, 2002, *Ex Parte* Presentation, Preliminary Results of SHHH Mobile Phone Survey at 2 and Comments on Accessories from Survey Respondents at 1, Dana Mulvany Reply Comments at 1, Letter from Susan Matt to Washington State SHHH Members (visited June 17, 2003) <http //www wasa-shhh org/telecommunications htn>

[170] *See* Cingular/Siemens April 4, 2003, *Ex Parte* Presentation at 6, 15, Motorola July 3, 2003, *Ex Parte* Letter at 2, 4, Sony Ericsson March 13, 2003, *Ex Parte* Presentation at 4, 7

[171] *See* HIA March 26, 2003, *Ex Parte* at 2-3 Although HIA has expressed concern regarding what claims hearing aid manufacturers can make on product packaging with respect to compatibility with digital wireless phones, we note no FDA enforcement issues that would preclude such labeling *See* Letter from Harold A Pellerite, FDA Center for Devices and Radiological Health, to Marlene H Dortch, WT Docket No 01-309 (July 2, 2003)

[172] HIA February 20, 2003, *Ex Parte* at 2

[173] HIA March 26, 2003, *Ex Parte* at 2

59 We are comfortable relying on these commitments because HIA represents a significant portion of the market for these devices [174] Market forces should provide a sufficient incentive for hearing aid manufacturers to honor their commitments We expect, in light of the commitment that HIA has made in the record of our proceeding, that this commitment will be honored by HIA's members, and we will view a failure to do so as a matter that may be appropriate for further examination by the Commission Through the complaint procedures discussed below, we will be able to determine whether and to what extent compatibility problems are a result of wireless phones or hearing aids, and we will monitor the status of accessibility and consider taking further action, if appropriate [175] While not a guarantee that every hearing aid user will be able to use digital wireless handsets meeting the ANSI standard, the measures being taken by hearing aid manufacturers, combined with wireless handset manufacturers' compliance with the requirements of this Order, should significantly expand the accessibility of digital wireless phones and services to individuals with hearing disabilities

60 We note that the HAC Act contemplates that phones subject to the requirements need only be capable of effective use with hearing aids designed for use with digital wireless phones The statute requires telephones to "provide internal means for effective use with *hearing aids that are designed to be compatible with telephones which meet established technical standards* for hearing aid compatibility."[176] We interpret this to mean that the statute does not require covered telephones to be compatible with all hearing aids, but rather only hearing aids with sufficient immunity to be intended for use with wireless devices and services. We believe this would refer to hearing aids meeting a U2 level of immunity under ANSI C63 19, since many newer hearing aids can meet this standard and because, when combined with a U3 or U3T digital wireless phone, the combination should allow for normal use according to ANSI C63 19 As a result, we do not expect digital wireless phones meeting the requirements of this Order to be compatible with hearing aids that lack sufficient immunity (*i.e.* those meeting less than a U2 level) It is possible that the hearing aid user may need to purchase a new hearing aid before being able to take advantage of digital wireless phones and services

61 The HAC Act refers to providing for *internal means* for effective use with hearing aids We interpret this to mean that the capability must be provided as an integral part of the phone, rather than through the use of add-on components that significantly enlarge or alter the shape or weight of the phone as compared to other phones offered by the manufacturer. Until hearing aid compatibility is provided internally in digital wireless handsets in accordance with this Order, consumers can reduce or even eliminate the interference to their hearing aids by increasing the distance between the hearing aid and the wireless phone through the use of accessory devices such as neck loops or hands-free headsets [177] However, we are aware that many consumers indicate that they are unduly restricted by accessory devices because they are cumbersome, inconvenient, and expensive [178]

[174] HIA indicates that its members represent approximately 90 percent of the market for hearing aids in the U.S *See* HIA June 19, 2003, *Ex Parte* submission

[175] 47 C F R Part 68, Subpart E

[176] 47 U S C § 610(b)(1)(B) (emphasis added)

[177] *See* AG Bell Comments at 4, J Harkins, Gallaudet University Rehab Engineering Research Center on Telecommunications Access "Wireless Phones Making Them Work for You" (visited June 26, 2003) <http //tap gallaudet edu/WirelessPhones htm>

[178] *See* Consumer Action Network Comments at 2, TDI Comments at 4, AG Bell Reply Comments at 8, SHHH Sept 24, 2002, *Ex Parte* Letter at 2, SHHH Sept 12, 2002, *Ex Parte* ("SHHH Mobile Phone Survey for Users of Hearing Aids and Cochlear Implants")

62 Some wireless industry parties have noted that, in the future, other techniques for coupling hearing aids with digital wireless phones may be developed as alternatives to telecoil coupling [179] We do not intend to impede these developments or preclude alternatives to telecoil coupling To the extent technological advances occur that result in substantially equivalent or greater access to and usability by individuals with hearing disabilities, we encourage the industry to pursue them [180] Once these new coupling methods are available, we encourage parties to keep us abreast of the developments by submitting information on the record and we may revisit the issue, if appropriate. In the meantime, we expect that industry will continue to provide products that meet the ANSI C63.19 standard in order for individuals with hearing disabilities to continue to have access to wireless telecommunications

63 Accordingly, we are adopting certain performance standards contained in the 2001 version of ANSI C63 19 as the applicable technical standard for wireless hearing aid compatibility. We encourage ANSI to work with the relevant stakeholders to review the standard periodically to determine whether improvements to the standard are warranted ANSI should submit any revisions to the standard to the FCC for consideration of whether to incorporate the modified standard into FCC rules To help ensure that our rules continue to reflect the current standard,[181] we delegate to the Chief, Wireless Telecommunications Bureau, in coordination with Chief, Office of Engineering and Technology, the authority to approve future versions of ANSI C63.19 to the extent that the changes to the standard do not raise major compliance issues At the same time, we recognize the necessity to provide opportunity for notice and comment on any changes or modifications that could affect compliance with our regulations In cases, therefore, where major changes have been made that could affect compliance, the Commission will initiate an appropriate rulemaking proceeding to consider adoption of updated versions.[182]

64 We note that CTIA and Motorola have requested that the Commission refrain from requiring manufacturers to test wireless handsets in analog mode to establish their performance rating according to ANSI C63.19.[183] They assert that testing under the analog component of the test distorts the results for dual mode phones. We understand that there are very few, if any, handsets presently on the market which operate exclusively in the analog mode, and wireless analog phones do not present the same RF interference problems to hearing aids as do digital wireless phones Because this proceeding is primarily focused on solving the problems of digital wireless phone use by hearing aid users, testing of phones in analog mode seems to be unnecessary.[184] Therefore, in order to avoid distorting the test results for wireless phones tested in digital mode, we find that the phones need not be tested under the analog test measurement prescribed by ANSI C63.19.

---

[179] CTIA Comments at 18, TIA Comments at 22-23 *See* also CTIA June 24, 2003, *Ex Parte* at 7 (advocating allowing manufacturers flexibility to determine the best way to provide inductive coupling capability), Cingular/Siemens June 5, 2003, *Ex Parte* at 11 (stating that rules should support "equivalent facilitation" to encourage innovative solutions that take advantage of new technologies).

[180] Under the Americans with Disabilities Act (ADA), the exception for "equivalent facilitation" recognizes that future technologies may be developed, or existing technologies could be used in a particular way, that could provide the same functional access in ways not envisioned by the ADA standards *See* Americans with Disabilities Act (ADA) Accessibility Guidelines, 36 C F.R Part 1191, Appendix A at 2 2

[181] *See Wireline HAC Order*, 11 FCC Rcd 8249, 8287

[182] *See* Procedures for Measuring Electromagnetic Emissions From Digital Devices, Report and Order, GEN. Docket No 89-44, 7 FCC Rcd 3128, 3130 (1992)

[183] CTIA June 24, 2003, *Ex* Parte Presentation at 4, Motorola May 5, 2003, *Ex Parte* Letter at 2.

[184] To the extent hearing aid users have difficulty using wireless phones in the analog mode, such phones should provide telecoil coupling capability consistent with the U3T level prescribed by ANSI C63 19, and they should employ means to minimize other types of electromagnetic energy that could interfere with hearing aids (such as a programmable function that enables the user to control the backlight)

B. Implementation Requirements

65 In order to promote competition among digital wireless handset manufacturers and to ensure that consumers have a range of options for wireless telecommunications, we adopt the following implementation requirements We require, within two years, that each digital wireless handset manufacturer and each carrier providing digital wireless services to make commercially available at least two handsets for each air interface in its product line (*i e* , CDMA, TDMA, GSM, and iDEN) which meet the U3 performance level (acoustic coupling) under ANSI C63 19 This means that carriers must offer consumers at least two compliant phone models for each air interface they offer, but not necessarily two for every manufacturer they carry However, within two years, we require each Tier I wireless carrier offering digital wireless services to make available to consumers at least two phone models that meet the U3 requirements, or 25 percent of the total number of wireless phone models it offers, whichever is greater [185] By the end of three years, manufacturers and carriers must offer at least two digital wireless handsets meeting the U3T performance level for providing telecoil coupling capability (inductive coupling) for each air interface offered Carriers must make available all of their phone models that comply with the requirements of this paragraph for consumers to test in each retail store that carriers own or operate In addition, carriers should use their best efforts to provide compliant phones to consumers within 48 hours of ordering

66 In addition, by February 18, 2008, the date on which wireless carriers may discontinue providing analog service in accordance with the *Analog Sunset Order*,[186] we require 50 percent of all phone models offered by digital wireless phone manufacturers and service providers to meet the U3 performance level for acoustic coupling as a reasonable step toward manufacturers' incorporation of hearing aid compatible functions into their phones For purposes of calculating this 50 percent compliance percentage, as well as the 25 percent compliance percentage set forth above, we require wireless carriers and handset manufacturers to base their calculations on the total number of unique digital wireless phone models they offer throughout the nation These requirements constitute steps toward our goal of having wireless phone manufacturers and service providers implement acoustic coupling capability ("U3") in all digital wireless phones at some point in the future.

67 In order to facilitate the ability of hearing aid users to obtain phones that comply with these implementation requirements, we require any reseller of a digital wireless carrier's product offerings to carry, at a minimum, the same number of compliant phones that the carrier offers at its retail stores In addition, we encourage distributors of digital wireless phones to offer compliant phones in their retail outlets

68. We note that Cingular and Siemens have asked that phone manufacturers be permitted to use a "seed stock approach" to provide compliant handsets, under which handsets would be provided by manufacturers to consumers, in a timely fashion, upon request.[187] Digital wireless phone manufacturers and carriers that choose to offer compliant handsets through a central distribution point, rather than through individual retail outlets, must do so in a timely fashion Specifically, as we have noted above,[188] we expect that carriers will make their best efforts to provide compliant phones to consumers that order them within 48 hours of the order to an address designated by the consumer. We note that we do not view

[185] The Commission defined Tier I wireless carriers in the Enhanced 911 Phase II proceeding as the six CMRS carriers with national footprints (AT&T Wireless, Cingular Wireless, Nextel Communications, Sprint PCS, Verizon Wireless, and T-Mobile USA) *See* Revision of the Commission's Rules to Ensure Compatibility With Enhanced 911 Emergency Calling Systems, 17 FCC Rcd 14841, 14843 (2002)

[186] *Analog Sunset Order*, 17 FCC Rcd 18401, 18443

[187] Cingular/Siemens May 15, 2003, *Ex Parte* at 3

[188] *See* para 65, *supra*

the seed stock approach as altering the obligation of carriers to make sure that they offer the requisite number of compliant handsets that will work on their network, nor would it alter the carriers' obligation to provide their compliant handsets in their retail stores for consumers to test To the contrary, the seed stock approach merely provides the flexibility to offer compliant wireless phones through a central distribution point

69 We recognize that this implementation approach could have a disproportionate impact on small phone manufacturers or those that sell only a small number of digital wireless handsets in the United States, as well as on carriers that offer only a small number of digital wireless handsets In order to address this, we adopt a *de minimis* exception for manufacturers and carriers that offer a small number of handset models in the U S Specifically, if a manufacturer or carrier offers two or fewer digital wireless handset models in the U.S , it is exempt from the compatibility requirements in this Order If a manufacturer or carrier offers three digital wireless handset models, it must make at least one compliant phone model in two years Furthermore, to the extent there are digital wireless providers that obtain handsets only from manufacturers that offer two or fewer digital wireless phone models in the U.S , the service provider would likewise be exempt from the rules Similarly, if a service provider obtains handsets only from manufacturers that offer three digital wireless phone models in the U.S., that service provider would only have to offer one compliant handset model We note that, by providing this *de minimis* exception, this does not mean that consumers living in areas with a limited choice of carriers, such as in rural areas, will be unable to obtain compliant phones As CTIA has asserted, it appears that there are other avenues available for consumers to order compliant phones if they are unable to obtain one from one of their local carriers [189] For example, consumers may be able to order a phone from the roaming partner of a local wireless carrier or directly from a wireless handset manufacturer's web site.[190]

70 In addition, in meeting the two- and three-year requirements, we encourage digital wireless phone manufacturers and service providers to provide at least one compliant phone that is a lower-priced model and one model that has higher-end features. For purposes of meeting the 50 percent level, manufacturers and carriers should continue to offer one lower-priced model and one model with higher-end features, and the features and prices of any additional compliant phones are at the discretion of the manufacturer or carrier These steps should help to ensure that consumers have a variety of technology and feature choices We also expect that these digital wireless phones will be offered in conjunction with attractive service plans and be as equivalent to other non-HAC phones as possible. These measures will ensure that individuals with hearing disabilities will enjoy many of the same choices in wireless telecommunications options that are available to individuals without hearing disabilities.

71 We recognize that, as manufacturers engage in testing under ANSI C63 19, some handset design changes may be necessary in some cases With respect to meeting our telecoil coupling requirements (*i e.*, the "U3T" rating), we have allowed for three years until the first implementation benchmark that must be met by manufacturers and service providers. Because handset design cycles can take one year or more,[191] we conclude that three years should be sufficient time for manufacturers to make design changes, if necessary, and begin delivering phones that comply with the telecoil coupling requirements. In addition, we believe that two years is an appropriate period of time to allow for manufacturers to produce and label digital wireless phones which comply with the U3 level for reduced

[189] *See* CTIA July 8, 2003, *Ex Parte*

[190] *Id*

[191] *See* Nokia July 1, 2003, *Ex Parte* at 4 (indicating that it is possible to include certain features within 6 months to a year) *See also* K D Schwartz, Illustration by C Henry, "Triumph of a new design paradigm," *Electronic Business*, Dec 1, 2002 (visited July 8, 2003) <http //www e-insite net/eb-mag/index asp?layout=article&articleid=CA260850&&> (referring to handset development cycles being shortened from 12 to 18 months down to a six- to nine-month time frame)

RF emissions, and for service providers to begin offering them to consumers [192] For purposes of meeting the two-year time frame for offering phones meeting the reduced electromagnetic emissions part of the ANSI standard (the "U3" rating), we anticipate that most phones will not require changes to the core design In fact, there are some handset manufacturers that indicate that they have some digital wireless handsets currently on the market that meet the U3 level [193] As a result, we require carriers and manufacturers to make commercially available two handsets per air interface offered which comply with the U3 criteria of ANSI C63 19 within two years, and we require carriers and manufacturers to make commercially available two handsets per air interface offered which comply with the U3T criteria of the standard within three years.[194] These time periods should also provide sufficient time to label product packages and to incorporate information on the standard into user manuals.

72. In an effort to ensure consumers continued accessibility and a range of product options, we require 50 percent of all phone models offered by digital wireless phone manufacturers and service providers to be compliant with the requirements for acoustic coupling (*i e* , U3) by February 18, 2008, the date on which wireless carriers may discontinue providing analog service in accordance with the *Analog Sunset Order* [195] This is part of a process by which manufacturers should begin to incorporate accessibility for individuals with hearing disabilities into all of their handsets As the Commission and Congress have recognized, access to telecommunications is essential for participation in nearly all aspects of society [196] As a policy matter, it is important to ensure that individuals with disabilities are not left behind as digital technology evolves and improves wireless telecommunications. Nor should individuals with hearing disabilities be limited to a small number of product offerings In this proceeding, although we are initially subjecting only a limited number of digital wireless handsets to our rules, we expect handset manufacturers and wireless service providers to continue efforts to incorporate accessible features into all of their products and services

73. We consider providing compatibility in one half of phone models by February 18, 2008, as a feasible and desirable interim goal We believe that, as handsets are tested and more attention and resources are focused on the issue of compatibility of wireless devices with hearing aids, the wireless industry will find ways to achieve this important goal and that it may become easier over time. As a result, this time period should provide sufficient time to apply the solutions to additional handset models This will further expand the wireless telecommunications options for individuals with hearing disabilities As manufacturers gain experience from working with the standard, the ability to incorporate higher levels of interference control will become more practicable

74 Shortly after three years after the effective date of this Order, FCC staff will deliver to the Commission a report that assesses the impact of our rules in achieving greater compatibility between hearing aids and digital wireless phones. In addition, the staff report will examine the development of new technologies that could provide greater or more efficient accessibility of wireless telecommunications to hearing aid users The staff report also will examine the impact of this Order's compatibility requirements on cochlear implant and middle ear implant users and their ability to use

[192] In addition, consumer groups support a two-year time frame for providing digital wireless handsets which comply with our rules. *See* RERC Feb 28, 2002, *Ex Parte* Presentation, COR Comments at 1, SHHH Comments at 9

[193] *See* Motorola Jan 31, 2003, *Ex Parte* Presentation at 14. Nokia July 1, 2003, *Ex Parte* Presentation at 8, Nokia July 3, 2003, *Ex Parte* Letter

[194] As noted above, Tier I wireless carriers must make available within two years at least two phone models that meet the U3 requirements, or 25 percent of the total number of wireless phone models it offers, whichever is greater *See supra* para 65

[195] *Analog Sunset Order,* 17 FCC Rcd 18401, 18443

[196] *Section 255 Order,* 16 FCC Rcd 6417, 6420, 47 USC 151

digital wireless phones This report will form the basis for the Commission to initiate a proceeding to evaluate (1) whether to increase of decrease the 2008 requirement to provide 50 percent of phone models that comply with a U3 rating, (2) whether to adopt HAC implementation benchmarks beyond 2008, and (3) whether to otherwise modify the HAC requirements We commit to initiate this proceeding soon after the report is issued If the staff report and the record of the proceeding demonstrate that the 50 percent requirement has proven effective and practicable, we expect to establish a higher percentage requirement to be implemented after 2008, consistent with our overall goal to ensure access to digital wireless services by individuals who use hearing aids

75 We require that tests be conducted to determine whether handsets, selected by the manufacturers as potential candidates for hearing aid compatibility, meet the U3 or U3T performance levels under the ANSI C63 19 standard Manufacturers should then certify compliance with the compatibility requirements in this Order through the equipment authorization process set forth in Part 2 of our rules [197] In order to verify compliance, manufacturers and service providers should include in their implementation reports a demonstration that they are offering a sufficient number of compatible handsets under our rules This may necessitate a statement of how many handset models are being offered in the U S market overall as well as the number of compatible handset models, in order for us to verify that the 50 percent level has been achieved [198] For purposes of determining whether that level has been reached, the determination of the number of handsets on the market will be made as of the time of the report. In addition, in order to verify whether a manufacturer or carrier qualifies for the *de minimis* exception, entities should submit reports indicating the number of handsets they offer in the U.S

76. We acknowledge that these requirements may be more difficult to implement for some air interfaces than for others For example, parties have noted the difficulties presented by GSM technology with respect to reducing RF emissions to levels required under ANSI C63 19 However, there is evidence that some manufacturers produce digital wireless phones for the GSM interface that are close to, or capable of, complying with the U3 and U3T performance levels of the ANSI C63.19 standard.[199] In addition, the Commission is committed to the principle of technological neutrality in its regulatory requirements For this reason, we impose the requirements across all transmission technologies.

77 We also note that there are some digital wireless devices that are not designed to be held to the user's ear, but which provide voice functionality in addition to serving as a personal digital assistant (PDA) or similar functionality. Typically, these devices employ a headphone or earphone device to utilize the two-way voice functionality. We understand that, because the electronics of these devices are held at a distance from the ear, they would be unlikely to cause RF interference or other EMI to hearing aids Additionally, a telecoil contained in the device itself would not be practicable because of the large magnetic field that would need to be created given the distance that these devices will be used from the hearing aid. We expect telecoil capabilities will be developed through headsets or other means. Because of the nature of these devices, we do not require digital wireless devices that do not have any built-in speaker or ear piece to be compliant with the ANSI C63.19 requirements set forth in this Order at this time We will continue to monitor the use of these devices and may revisit this decision in the future.

78 The record before us does not support extending the requirements to all digital wireless phones in the near term Manufacturers have asserted that compliance for all digital wireless is not technologically feasible at this time and, such a requirement could produce undesired economic consequences, including restricted choice of handsets and a stifling of emerging technological

[197] *See* 47 C F R § 2 1033

[198] *See* discussion of reporting requirements at paras 89-91, *infra*

[199] *See* Nokia April 7, 2003, *Ex Parte* Presentation at 7, Motorola January 31, 2003, *Ex Parte* Presentation

advances [200] For example, certain manufacturers have already begun testing their handsets to the ANSI standard.[201] Those manufacturers have shown that some of their handsets are currently capable of meeting the standard [202] They have also asserted, however, that certain features associated with more feature-rich phones present an ongoing problem that they will need time to address. In particular, Nokia and Ericsson have indicated that newer model phones that may be smaller and which include larger displays and features such as games, music, and enhanced keypads, would present battery drain, interference, and form factor issues if required to also incorporate hearing aid compatibility features.[203] In a related provision of the HAC Act, the Commission is instructed to "specifically consider the costs and benefits to all telephone users, including persons with and without hearing impairments" in formulating rules and to "ensure that regulations adopted to implement this section encourage the use of currently available technology and do not discourage or impair the development of improved technology [204] We have, therefore, tailored our rules in a manner that recognizes that the costs of requiring compliance by all phones, at this time, would outweigh the potential benefits [205]

79 Additionally, we have tailored our rules to ensure they do not impair the introduction of new technologies. By limiting compliance, in the short term, to two handsets within two years, we are able to allow manufacturers the ability to experiment with and design new technologies and features. As noted in the proceeding, the more feature-rich wireless phones may have a greater difficulty in complying because the interference created to display and run some of those programs add to the EMI already being generated by the phone [206] We believe, therefore, that requiring compliance in all phones, in the near term, may hinder the introduction of such wireless phones

80 Moreover, the Commission is concerned that requiring 100 percent compliance at this time could have the unintended effect of stifling innovation. The HAC Act specifically directs the Commission to structure its rules in a manner that "[does] not discourage or impair the development of improved technology."[207] The diversity of wireless phones and features not only represent a robust market of ideas becoming reality, they represent a market that is characterized by rapid change in capabilities of the devices. For instance, picture phones and movie phones are becoming available at prices that may make them attractive to consumers Interference levels of these devices are not known by the Commission at this time However, as a policy matter and consistent with the spirit of the HAC Act, we do not want to deter the manufacturers of these products from bringing them to market. Based on the record before us and the requirements of the HAC Act, we conclude that full compliance is not feasible at this time

81. However, we are convinced that as manufacturers work with incorporating design changes into their handsets they will gain valuable knowledge on how to control RF interference and other EMI, as well as how to ensure their handsets are capable of producing a sufficient magnetic field to allow for telecoil coupling The Commission, therefore, asks manufacturers to include in their implementation

[200] *See* CTIA June 13, 2003, *Ex Parte* at 3, Motorola July 3, 2003, *Ex Parte* at 4, Nokia July 1, 2003, *Ex Parte* Presentation at 11, Siemens June 20, 2003, *Ex Parte* at 1-2, Sony-Ericsson June 18, 2003, *Ex Parte* at 1-3.

[201] *See* Motorola January 31, 2003, *Ex Parte* at 16, Nokia April 10, 2003, *Ex Parte* Presentation at 7; Cingular/Siemens April 4, 2003, *Ex Parte* at 4

[202] *Id*

[203] *See* Nokia April 10, 2003, *Ex Parte* Presentation at 10, Sony-Ericsson June 18, 2003, *Ex Parte* Letter at 2-3

[204] *See* 47 U S C § 610(e)

[205] *See* 47 U.S C § 610(e)

[206] *See* CTIA July 3, 2003, *Ex Parte* Letter at 1

[207] *See* 47 U S C § 610(e)

reports information that will help the Commission to make an informed decision on the soundness of requiring a greater number of handsets be capable of meeting the ANSI C63 19 standard [208] Such information should focus on the extent to which the manufacturers' product line is capable of meeting the ANSI C63 19 standard This information will be considered in the Commission staff report at the end of three years and in the subsequent proceeding to evaluate whether to modify the implementation requirements set forth in this Order

C. Labeling, Reporting, and Outreach

82 In this section, we discuss the labeling and reporting requirements we adopt pursuant to the requirements of the HAC Act.[209] We also address outreach efforts and we encourage digital wireless phone manufacturers and service providers to engage in public outreach designed to educate the public, retail personnel, and people in the audiology and hearing aid dispensing field about the use of digital wireless phones with hearing aids and cochlear implants

83 Labeling As detailed below, the Commission will require manufacturers to place a label on the exterior packaging containing the wireless telephone indicating the U-rating of the wireless telephone The Commission will also require manufacturers to include more detailed information on the ANSI standard in a product insert or the wireless telephone's manual Further, we require service providers to ensure that the label is made visible to individuals with hearing disabilities so they may determine which wireless telephone best meets their individual needs In adopting these requirements, the Commission has balanced the needs of individuals with hearing disabilities to have access to sufficient information to make an informed decision, with the needs of manufacturers to be able to promote their products with as few encumbrances as possible. We find that the labeling requirement we adopt through this Order will provide sufficient information to the consumers, while not restricting the ability of manufacturers and service providers to promote and display their products

84 The HAC Act instructs that the Commission "shall establish requirements for the labeling of packaging materials . to provide adequate information to consumers on the compatibility between telephones and hearing aids "[210] This directive from Congress expresses its clear intent that we not only establish regulations to ensure access to telephones covered by the HAC Act, but that we make certain that consumers have the information necessary to make an informed decision We, therefore, adopt requirements that will accomplish that task.

85 First, we require manufacturers to affix a label on the exterior of the wireless telephone's box that provides the particular U-rating for that model of handset. The label should be conspicuous so that the consumer, without any assistance, can discern the U-rating of the particular hearing aid-compatible phone Unlike our rules governing wireline hearing aid compatibility rules, we do not require the phone itself to be labeled. We require labels to be affixed to the exterior of the packaging in order to inform the purchaser of the quality of interoperability between a wireless telephone and a hearing aid [211]

86 Additionally, we require manufacturers to develop language for a product insert or placement in the handset's manual. Such information will allow the consumer to better understand the U-rating system and could help frame the consumer's expectation with regards to the performance of the handset. Moreover, an explanation of the U-rating would provide consumers with information needed to aid

[208] *See* paras 89-91, *infra* (detailing information that manufacturers and service providers will need to include in their reports)

[209] *See* 47 U S C § 601(d)

[210] *Id*

[211] 47 C F R § 68 300

audiologists in providing a hearing aid that works well with a wireless telephone We are not adopting specific language for inclusion in the insert, instead, we allow each manufacturer to develop language that achieves the goal of providing consumers with more detailed information on the ANSI standard For example, the insert should explain that a higher U-rating and UT-rating indicate that the wireless phone has a lower RF emissions level and higher magnetic signal quality, respectively, which will enable successful operation of the wireless phone with more hearing aids

87 Furthermore, to ensure that the information is conveyed to consumers, we require service providers to ensure that the U-rating is made available, either through display on the handset's box, separate literature on which model handsets the provider offers that are compatible, through posting information on their Internet web site, or by any other means the service provider determines is sufficient, to individuals with hearing disabilities so they may determine which wireless telephone best meets their individual needs We recognize that service providers offer their products and services through a variety of channels, including the Internet, carts in shopping malls, agents, and stand-alone stores Some of these entities are small businesses with limited resources We, therefore, are adopting a requirement that provides flexibility for service providers to determine how best to convey the information to the consumer We encourage service providers to use the flexible approach we provide to adequately inform consumers with disabilities about their choices. Should the Commission receive a large volume of complaints concerning the inability of consumers to find the information our rules are asking be conveyed, we will revisit this decision We also encourage service providers to train their personnel and agents so that they will be able to assist consumers that may have questions concerning handsets models that are hearing aid compatible

88 In order to facilitate the matching of digital wireless handsets with hearing aids, we encourage hearing aid manufacturers to test and label their hearing aid models with their immunity level in accordance with ANSI C63 19 Such labeling should be on models of hearing aids before they are customized, either by the manufacturer or audiologist, for the user's individual hearing loss and physiology. Because ANSI C63 19 contemplates matching hearing aids together with digital wireless phones in order to produce a satisfactory result, individuals with hearing disabilities, audiologists, and hearing aid dispensers would benefit from knowing the immunity level of hearing aids to aid in the selection process We fully expect that hearing aid manufacturers will label hearing aid models with their specific ratings in accordance with ANSI C63.19 (*i.e* , U2) for several reasons. First, providing this information to consumers with hearing disabilities is in their interest from a marketing point of view. As we have noted, the number of Americans with hearing disabilities is growing, and so is wireless phone use. Thus, informing customers about the immunity level of their hearing aids would serve the hearing aid manufacturers' market interest by facilitating hearing aid use with digital wireless phones. Second, the FDA has indicated that claims by hearing aid manufacturers concerning their ANSI immunity level, if supported by data from bench or laboratory tests, would not present enforcement concerns [212] And, third, HIA has already taken a first step by agreeing on the record to include written material supplied with hearing aids that addresses the anticipated performance of a particular class of hearing aid models [213] We encourage HIA to submit a report within six months after the release of this Order informing us of the plans of hearing aid manufacturers to label hearing aid models with their immunity levels according to the ANSI standard If inadequate progress is made in this area, we will examine the scope of our jurisdiction over hearing aid manufacturers in order to facilitate the goal of achieving hearing aid compatibility for consumers

[212] *See* Letter from Harold A Pellerite, FDA Center for Devices and Radiological Health, to Marlene H Dortch, WT Docket No 01-309 (July 2, 2003)

[213] *See* HIA July 2, 2003, *Ex Parte* submission

89 Reporting We require wireless carriers and handset manufacturers to report every six months on efforts toward compliance with the requirements of this Order during the first three years, and then annually thereafter through the fifth year of implementation These reports will serve dual purposes they will assist us in monitoring the progress of implementation, and they will provide valuable information to the public concerning compatible handsets The reporting requirement will extend through the end of the fifth year following the effective date of this Order to assist in verifying compliance with the requirement to make 50 percent of all phone models offered compatible. Digital wireless phone manufacturers and service providers may submit joint reports, if they wish, in order to minimize the reporting burden The reports should describe manufacturer and carrier efforts aimed at complying with the requirements of this Order Specifically, the reports should provide the Commission with the following information

(1) digital wireless phones tested,

(2) laboratory used,

(3) test results for each phone tested,

(4) identification of compliant phone models and ratings according to ANSI C63.19,

(5) report on the status of product labeling,

(6) report on outreach efforts,

(7) information related to retail availability of compliant phones;

(8) information related to incorporating hearing aid compatibility features into newer models of digital wireless phones;

(9) any activities related to ANSI C63 19 or other standards work intended to promote compliance with this Order,

(10) total numbers of compliant and non-compliant phone models offered as of the time of the report, and

(11) any ongoing efforts for interoperability testing with hearing aid devices

90 Digital wireless service providers should highlight in their reports any differences in handset offerings among regions of their service areas. Reports may be filed electronically via our Electronic Comment Filing System (ECFS), which is accessible at www fcc gov.

91 In the fourth year following the effective date of these requirements, manufacturers and carriers should include in their reports information that will help the Commission to make an informed decision on whether to extend the requirements beyond 50 percent of digital wireless phone models offered Specifically, reporting entities should discuss the feasibility of making 100 percent of handsets capable of meeting the ANSI C63.19 standard These reports should provide as much specific information as possible concerning the cost of implementing hearing aid compatibility into the remaining digital wireless phones manufactured, as well as a comprehensive list of all such phones offered at that time

92 Outreach. We strongly encourage digital wireless handset manufacturers and service providers to engage in outreach efforts These efforts would, ideally, include publicly identifying the compliant phones for consumers and audiologists. Public outreach could also list compliant phones on

carrier and manufacturer Internet sites, as well as communicating this information to consumer groups For example, wireless handset manufacturers have agreed to provide information on wireless phones that provide hearing aid compatibility characteristics through a website established by CTIA [214] In order to assist consumers as they shop for wireless phones, we strongly encourage carriers to train retail salespeople regarding which digital wireless phones are compliant [215] This could be enhanced by providing written materials at the point of sale, such as pamphlets or other promotional literature, specifically addressing the needs of individuals with hearing disabilities. Manufacturers and carriers might also consider developing consumer education programs aimed at reaching hearing aid and cochlear implant users Outreach efforts should also be directed toward audiologists and hearing aid dispensers, since these entities are in a good position to inform hearing aid users concerning the immunity of their hearing aids and, therefore, determine the likelihood that they will be able to use digital wireless phones and services

93 In addition, in order to respond to the desire expressed by consumers for a trial period within which to try out digital wireless phones to determine whether they will work properly with their hearing aids, we encourage digital wireless service providers to provide a 30 day trial period or otherwise be flexible on their return policies for consumers seeking to obtain compliant phones. Consumers may need to experiment with various features and phone models to find the best match for their individual situation. Evidence in the record of this proceeding indicates that certain handset form factors, such as the "clamshell" design, tend to work better for hearing aid users. Also, any design which distances the wireless phone's antenna from the hearing aid tends to minimize RF emissions to the phone. In addition, as discussed in paragraph 45, wireless phones with a programmable backlight setting allow the user to control the backlight of the display screen and keypad, which can also minimize interference to hearing aids

94 The Commission, through the Consumer & Governmental Affairs Bureau, will endeavor through its educational and outreach efforts, to ensure that those most likely affected are informed about the actions taken in this Order In addition to making facts sheets and other informational materials available for dissemination through the Commission's web site and national consumer call centers, the Commission will release a Consumer Alert outlining, among other things, the requirements the Commission is placing on carriers providing digital wireless services and digital wireless phone manufacturers to make available compliant handsets. In conjunction with these efforts, the Commission will launch a comprehensive outreach campaign specifically targeted to reach individuals who use hearing aids The Commission will directly contact those groups and associations representative of such individuals providing them with information about the new requirements for dissemination to their members In addition, information will be provided to schools specifically addressing the educational needs of individuals with hearing disabilities In concert with these efforts, the Commission, through a coordinated effort with the Food and Drug Administration, will provide relevant information to groups and associations representing audiologists, as well as the medical community in general through various channels, to ensure that information is readily available to educate consumers about the accessibility of digital wireless phones to individuals who use hearing aids Finally, the Commission will provide media outlets likely to reach individuals who use hearing aids, as well as those of general distribution, with information outlining the requirements established in this Order.

[214] CTIA June 13, 2003, *Ex Parte* at 1-2 The web site will also include a message board where consumers can post experiences about wireless phones they have found work with their particular hearing aids The web site is available at <www accesswireless org>

[215] CTIA has also committed its member companies to work with carriers' sales forces, consumer groups, and professional organizations in an educational outreach effort *Id* at 2

D. Enforcement

95 Finally, we expand the scope of our rules for enforcing wireline hearing aid compatibility to permit subscribers to digital wireless service to bring informal complaints should either manufacturers or service providers fail to comply with the rules we adopt in this Order. Since the initial adoption of hearing aid compatibility rules for wireline phones, the Commission has recognized the essential role consumers must play in detecting non-compliance with our rules In this Order, the Commission extends its Part 68, Subpart E rules to allow consumers to file informal complaints if they find that service providers or manufacturers are not complying with our rules.[216] The rules contained in Part 68 Subpart E explain the procedures consumers must follow to initiate a complaint [217] For example, under the Part 68 rules, informal complaints regarding compliance with the hearing aid compatibility rules for wireline phones must first be filed with the state public utility commission, so long as the state has adopted our hearing aid compatibility rules and provided for enforcement of those sections [218] We extend that procedure to wireless phones Additionally, Part 68 explains the obligations of parties named in those complaints The deadlines contained in those rules ensure that consumers' complaints will be addressed in an expeditious manner.

VI. PROCEDURAL MATTERS

A. Regulatory Flexibility Act

96 The Final Regulatory Flexibility Analysis for this Report and Order, as required by the Regulatory Flexibility Act of 1980, see 5 U.S C § 604, is set forth in Appendix C.

B. Paperwork Reduction Act

97. The actions contained herein have been analyzed with respect to the Paperwork Reduction Act of 1995 (PRA) and found to impose new reporting and/or recordkeeping requirements or burdens on the public. Implementation of these reporting and/or recordkeeping requirements will be subject to approval by the Office of Management and Budget (OMB) as prescribed by the PRA, and will go into effect upon publication by Commission staff of an announcement in the Federal Register that OMB has approved the information collection.

Paperwork Reduction Analysis

98 This Report and Order contains a new information collection. As part of our continuing effort to reduce paperwork burdens, we invite the general public and the Office of Management and Budget ("OMB") to take this opportunity to comment on the information collection contained in this Report and Order, as required by the Paperwork Reduction Act of 1995 [219] Public and agency comments are due 60 days from the date of publication of this Report and Order in the Federal Register. Comments should address.

- Whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility.

---

[216] *See* Appendix C, "Final Rules "

[217] *See* 47 C F R § 68 400-423 Free online access to the Commission's rules is available at <http //www.gpo gov>

[218] *See* 47 C F R § 68 414 Three states have adopted our hearing aid compatibility requirements· Illinois, Massachusetts, and Vermont

[219] *See* Pub L No 104-13

- The accuracy of the Commission's burden estimates
- Ways to enhance the quality, utility, and clarity of the information collected
- Ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology

99 Written comments by the public on the new information collection are due 60 days after the date of publication in the Federal Register Written comments must be submitted by the OMB on the proposed and/or modified information collections on or before 60 days after the date of publication in the Federal Register In addition to filing comments with the Secretary, a copy of any comments on the information collections contained herein should be submitted to Judith Herman, Federal Communications Commission, Room 1-C804, 445 Twelfth Street, S W , Washington, D C 20554, or via the Internet to Judith Herman@fcc.gov, and to Kim Johnson, OMB Desk Officer, Room 10236 New Executive Office Building, 725 Seventeenth Street, N W., Washington, D.C 20503, or via the Internet to Kim_A _Johnson@omb eop.gov.

C. Accessible Formats

100 To request materials in accessible formats for individuals with disabilities (Braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc gov or call the Consumer & Governmental Affairs Bureau at 202-418-0531 (voice), or 202-418-7365 (tty).

VII. ORDERING CLAUSES

101 IT IS ORDERED that, pursuant to the authority of sections 1, 4(i), 7, 10, 201, 202, 208, 214, 301, 303, 308, 309(j), and 310 of the Communications Act of 1934, as amended, 47 U.S C. §§ 151, 154(i), 157, 160, 201, 202, 208, 214, 301, 303, 308, 309(j), and 310, the rule changes specified in Appendix C are adopted

102 IT IS FURTHER ORDERED that the rule changes set forth in Appendix C WILL BECOME EFFECTIVE 60 days after publication in the Federal Register.

103 IT IS FURTHER ORDERED that the information collections contained in this Report and Order WILL BECOME EFFECTIVE following approval by the Office of Management and Budget. The Commission will publish a document at a later date establishing the effective date.

104. IT IS FURTHER ORDERED that, in accordance with the guidelines set forth in this Report and Order, manufacturers of digital wireless telephones and providers of digital wireless services must submit reports every six months during the first three years of the implementation period established herein, and then annually thereafter through the fifth year of implementation

105. IT IS FURTHER ORDERED that manufacturers must label packages containing compliant handsets as prescribed in this Report and Order.

106 IT IS ORDERED that digital wireless service providers must make available to consumers information on the performance ratings of compliant phones as prescribed in this Report and Order

107 IT IS FURTHER ORDERED that we deny Myers Johnson, Inc.'s petition to modify section 24 232.

108 IT IS FURTHER ORDERED that the Commission's Office of Public Affairs, Reference Operations Division, SHALL SEND a copy of this Report and Order, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration

FEDERAL COMMUNICATIONS COMMISSION

Marlene H Dortch
Secretary